Annex W Tahoe City Public Utility District

W.1 Introduction

This Annex details the hazard mitigation planning elements specific to the Tahoe City Public Utility District (TCPUD or District), a previously participating jurisdiction to the 2016 Placer County Local Hazard Mitigation Plan (LHMP) Update. This Annex is not intended to be a standalone document, but appends to and supplements the information contained in the Base Plan document. As such, all sections of the Base Plan, including the planning process and other procedural requirements apply to and were met by the District. This Annex provides additional information specific to TCPUD, with a focus on providing additional details on the risk assessment and mitigation strategy for this District.

W.2 Planning Process

As described above, the District followed the planning process detailed in Chapter 3 of the Base Plan. In addition to providing representation on the Placer County Hazard Mitigation Planning Committee (HMPC), the District formulated their own internal planning team to support the broader planning process requirements. Internal planning participants, their positions, and how they participated in the planning process are shown in Table W-1. Additional details on plan participation and District representatives are included in Appendix A.

Table W-1 TCPUD – Planning Team

Name	Position/Title	How Participated
Tony Laliotis	Director of Utilities	Agency representative, meeting attendance, annex completion
Dan Lewis	Utilities Superintendent	Agency representative, meeting attendance, annex completion

Coordination with other community planning efforts is paramount to the successful implementation of this LHMP Update. This section provides information on how the District integrated the previously approved 2016 Plan into existing planning mechanisms and programs. Specifically, the District incorporated into or implemented the 2016 LHMP through other plans and programs shown in Table W-2.

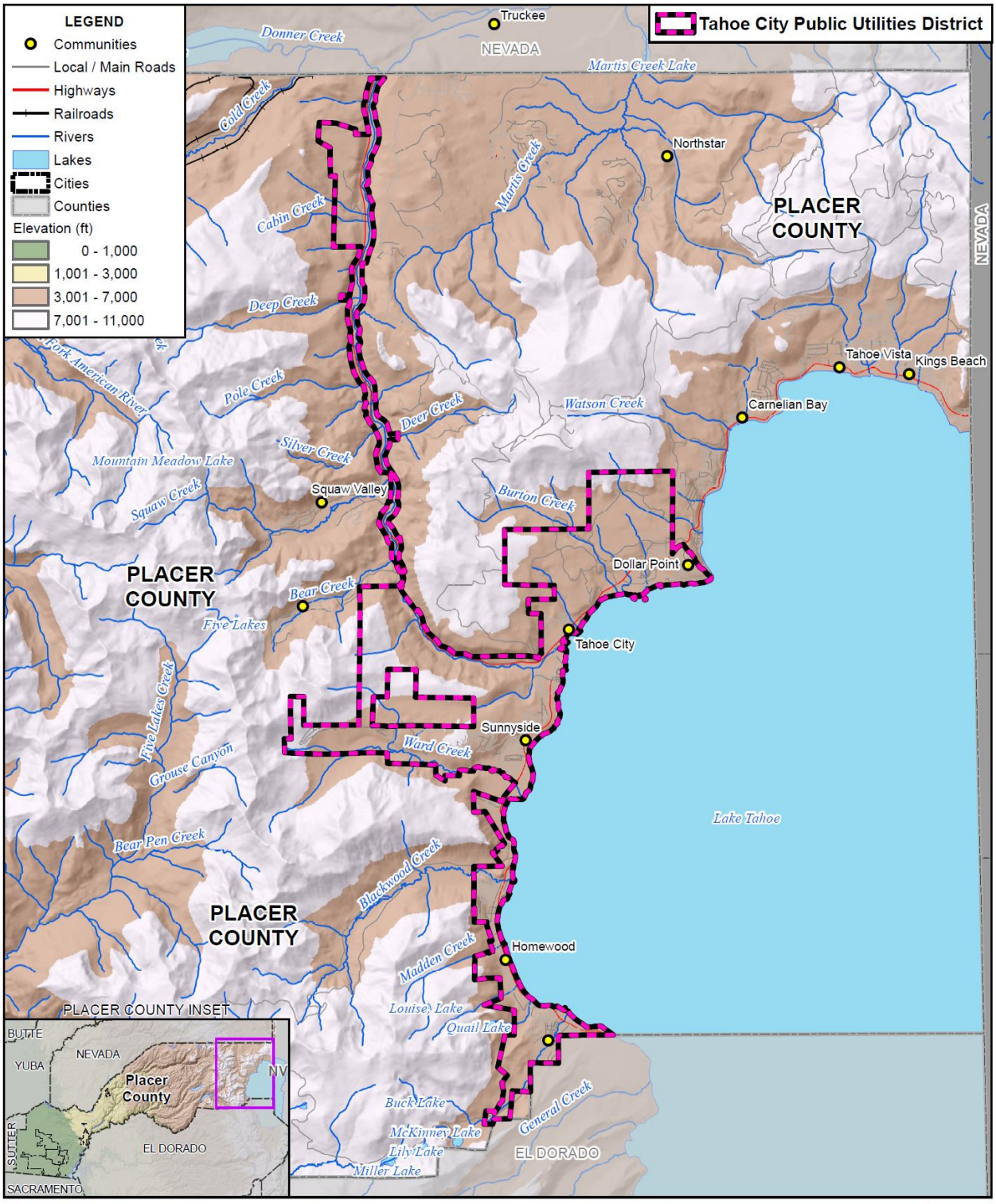
Table W-2 2016 LHMP Incorporation

Planning Mechanism 2016 LHMP Was Incorporated/Implemented In.	Details: How was it incorporated?
N/A	No mitigation related planning mechanisms have been completed since 2016

W.3 District Profile

The District profile for the TCPUD is detailed in the following sections. Figure W-1 displays a map and the location of the District within Placer County.

Figure W-1 TCPUD



W.3.1. Overview and Background

The Tahoe City Public Utility District was founded in 1938 to provide some of the governmental needs of the residents of Tahoe City. It is the oldest local government in the Tahoe Basin and was formed initially to provide public water service to the local community. Established under the State of California's Public Utility District Act, the founders of the District chose a form of government that could provide multiple types of services. The boundaries of the District extend from Emerald Bay to Dollar Hill, and along the Truckee River to the Nevada County line. The service area is very large, encompassing almost 22 square miles.

The TCPUD's provides sewer collection, parks facilities, and recreation services for the entire area of the District. Water service is provided in four separate systems and serves approximately half of the homes and businesses in the District. Water service is provided to approximately 4,000 customers; sewer services to 7,800 customers; and parks and recreation customers total over 500,000.

The Tahoe City area is characterized by mild summers and cool, wet winters, with an average high temperature in July of 82 and 42 in January. Annual precipitation in the watershed varies from an average of 65 inches in the west to approximately 40 inches per year in the east. The majority of precipitation occurs as snowfall during the winter months. A relatively small amount of precipitation occurs as rain during the spring and summer months.

W.4 Hazard Identification

TCPUD identified the hazards that affect the District and summarized their location, extent, frequency of occurrence, potential magnitude, and significance specific to District (see Table W-3).

Table W-3 TCPUD—Hazard Identification Assessment

Hazard	Geographic Extent	Likelihood of Future Occurrences	Magnitude/ Severity	Significance	Climate Change Influence
Agriculture Pests and Diseases	Limited	Unlikely	Negligible	Low	Medium
Avalanche	Limited	Likely	Critical	High	Medium
Climate Change	Extensive	Likely	Limited	Low	–
Dam Failure	Limited	Unlikely	Critical	Medium	Medium
Drought & Water Shortage	Significant	Likely	Critical	High	High
Earthquake	Significant	Occasional	Critical	High	Low
Floods: 1%/0.2% annual chance	Significant	Occasional	Limited	Medium/High	Medium
Floods: Localized Stormwater	Likely	Unlikely	Limited	Medium/High	Medium
Landslides, Mudslides, and Debris Flows	Limited	Likely	Negligible	Medium/High	Medium
Levee Failure	Limited	Unlikely	Limited	Low	Medium
Pandemic	Limited	Unlikely	Limited	Low	Medium
Seiche	Significant	Unlikely	Critical	Medium	Medium
Severe Weather: Extreme Heat	Limited	Likely	Limited	Low	High
Severe Weather: Freeze and Snow	Extensive	Highly Likely	Critical	Medium	Medium
Severe Weather: Heavy Rains and Storms	Significant	Highly Likely	Critical	Medium	Medium
Severe Weather: High Winds and Tornadoes	Significant	Highly Likely	Critical	High	Low
Tree Mortality	Significant	Highly Likely	Critical	High	High
Wildfire	Significant	Highly Likely	Critical	High	High

Geographic Extent
Limited: Less than 10% of planning area
Significant: 10-50% of planning area
Extensive: 50-100% of planning area

Likelihood of Future Occurrences
Highly Likely: Near 100% chance of occurrence in next year, or happens every year.
Likely: Between 10 and 100% chance of occurrence in next year, or has a recurrence interval of 10 years or less.
Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.
Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

Magnitude/Severity
Catastrophic—More than 50 percent of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths
Critical—25-50 percent of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability
Limited—10-25 percent of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability
Negligible—Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid

Significance
Low: minimal potential impact
Medium: moderate potential impact
High: widespread potential impact

Climate Change Influence
Low: minimal potential impact
Medium: moderate potential impact
High: widespread potential impact

W.5 Hazard Profile and Vulnerability Assessment

The intent of this section is to profile the District's hazards and assess the District's vulnerability separate from that of the Placer County Planning Area as a whole, which has already been assessed in Section 4.3 Hazard Profiles and Vulnerability Assessment in the Base Plan. The hazard profiles in the Base Plan discuss overall impacts to the Placer County Planning Area and describes the hazard problem description, hazard location and extent, magnitude/severity, previous occurrences of hazard events and the likelihood of future occurrences. Hazard profile information specific to the District is included in this Annex. This vulnerability assessment analyzes the property and other assets at risk to hazards ranked of medium or high significance specific to the District. For more information about how hazards affect the County as a whole, see Chapter 4 Risk Assessment in the Base Plan.

W.5.1. Hazard Profiles

Each hazard vulnerability assessment in Section W.5.3, includes a hazard profile/problem description as to how each medium or high significant hazard (as shown in Table W-3) affects the District and includes information on past hazard occurrences and the likelihood of future hazard occurrence. The intent of this section is to provide jurisdictional specific information on hazards and further describes how the hazards and risks differ across the Placer County Planning Area.

W.5.2. Vulnerability Assessment and Assets at Risk

This section identifies the District's total assets at risk, including values at risk, populations at risk, critical facilities and infrastructure, natural resources, and historic and cultural resources. Growth and development trends are also presented for the District. This data is not hazard specific, but is representative of total assets at risk within the District.

Assets at Risk and Critical Facilities

This section considers the TCPUD's assets at risk, with a focus on key District assets such as critical facilities, infrastructure, and other District assets and their values. With respect to District assets, the majority of these assets are considered critical facilities as defined for this Plan. Critical facilities are defined for this Plan as:

> ***Any facility, including without limitation, a structure, infrastructure, property, equipment or service, that if adversely affected during a hazard event may result in severe consequences to public health and safety or interrupt essential services and operations for the community at any time before, during and after the hazard event.***

This definition is further refined by separating out three classes of critical facilities:

> ***Class 1 facilities include those facilities that contribute to command, control, communications and computer capabilities associated with managing an incident from initial response through recovery.***

Class 2 facilities include those facilities that house Emergency Services capabilities.

Class 3 facilities are those facilities that enable key utilities and can be used as evacuation centers/shelters/mass prophylaxis sites, etc.

Additional information on the three classes of critical facilities is described further in Section 4.3.1 of the Base Plan.

Table W-4 lists critical facilities and other District assets identified by the District Planning Team as important to protect in the event of a disaster. TCPUD's physical assets, valued at over $62 million, consist of the buildings and infrastructure to support the District's operations.

Table W-4 TCPUD Critical Facilities, Infrastructure, and Other District Assets

Name of Asset	Type	Replacement Value	Which Hazards Pose Risk
Fairway Community Center	Community Center	$1,008,230	
Highland Community Center	Community Center	$665,130	
Tahoe Community Center	Community Center	$892,874	
Rideout Community Center	Community Center	Lease	
TCPUD Administration Building	Administration Building	$2,234,370	
Parks & Rec. Corp. Yard	Corp. Yard	$1,450,885	
Blackwood	Sewer Pump Station	$1,500,000	Sewage Release
Coast Guard	Sewer Pump Station	$1,500,000	Sewage Release
Harbor Master	Sewer Pump Station	$1,500,000	Sewage Release
Madden	Sewer Pump Station	$1,500,000	Sewage Release
McKinney	Sewer Pump Station	$1,100,000	Sewage Release
Meeks Bay	Sewer Pump Station	$1,100,000	Sewage Release
North Lane	Sewer Pump Station	$1,100,000	Sewage Release
Rubicon	Sewer Pump Station	$1,500,000	Sewage Release
Sunnyside	Sewer Pump Station	$2,000,000	Sewage Release
Bay Vista	Sewer Pump Station	$800,000	Sewage Release
Dollar 1	Sewer Pump Station	$800,000	Sewage Release
Dollar 2	Sewer Pump Station	$800,000	Sewage Release
Glenridge	Sewer Pump Station	$800,000	Sewage Release
Highway 89	Sewer Pump Station	$800,000	Sewage Release
Lonely Gulch	Sewer Pump Station	$800,000	Sewage Release
Marina	Sewer Pump Station	$800,000	Sewage Release
Park Terrace	Sewer Pump Station	$800,000	Sewage Release
Rubicon Bch	Sewer Pump Station	$800,000	Sewage Release

Name of Asset	Type	Replacement Value	Which Hazards Pose Risk
Tahoma	Sewer Pump Station	$800,000	Sewage Release
Waters Edge	Sewer Pump Station	$800,000	Sewage Release
Commons Beach	Sewer Pump Station	$800,000	Sewage Release
Sewer Gravity Line	4-inch Gravity Sewer Line	$4,449,375	Sewage Release
Sewer Gravity Line	6-inch Gravity Sewer Line	$24,310,589	Sewage Release
Sewer Gravity Line	6-inch Gravity Sewer Line	$59,310,067	Sewage Release
Sewer Gravity Line	6-inch Gravity Sewer Line	$4,864,635	Sewage Release
Sewer Gravity Line	6-inch Gravity Sewer Line	$936,457	Sewage Release
Sewer Gravity Line	6-inch Gravity Sewer Line	$401,712	Sewage Release
Sewer Gravity Line	8-inch Gravity Sewer Line	$2,884,172	Sewage Release
Sewer Gravity Line	8-inch Gravity Sewer Line	$9,933,772	Sewage Release
Sewer Gravity Line	8-inch Gravity Sewer Line	$1,160,531	Sewage Release
Sewer Gravity Line	8-inch Gravity Sewer Line	$631,840	Sewage Release
Sewer Gravity Line	10-inch Gravity Sewer Line	$1,582,395	Sewage Release
Sewer Gravity Line	10-inch Gravity Sewer Line	$2,467,070	Sewage Release
Sewer Gravity Line	10-inch Gravity Sewer Line	$1,924,683	Sewage Release
Sewer Gravity Line	10-inch Gravity Sewer Line	$350,152	Sewage Release
Sewer Gravity Line	10-inch Gravity Sewer Line	$122,559	Sewage Release
Sewer Gravity Line	12-inch Gravity Sewer Line	$676,368	Sewage Release
Sewer Gravity Line	12-inch Gravity Sewer Line	$1,068,389	Sewage Release
Sewer Gravity Line	12-inch Gravity Sewer Line	$865,517	Sewage Release
Sewer Gravity Line	15-inch Gravity Sewer Line	$1,598,464	Sewage Release
Sewer Gravity Line	15-inch Gravity Sewer Line	$1,045,749	Sewage Release
Sewer Gravity Line	15-inch Gravity Sewer Line	$694,154	Sewage Release
Sewer Gravity Line	18-inch Gravity Sewer Line	$449,963	Sewage Release
Sewer Gravity Line	18-inch Gravity Sewer Line	$2,049,435	Sewage Release
Sewer Gravity Line	18-inch Gravity Sewer Line	$236,863	Sewage Release
Sewer Gravity Line	21-inch Gravity Sewer Line	$2,361,980	Sewage Release
Sewer Gravity Line	24-inch Gravity Sewer Line	$1,643,125	Sewage Release
Sewer Gravity Line	24-inch Gravity Sewer Line	$108,082	Sewage Release
Sewer Gravity Line	24-inch Gravity Sewer Line	$191,108	Sewage Release
Sewer Gravity Line	27-inch Gravity Sewer Line	$42,600	Sewage Release
Sewer Gravity Line	27-inch Gravity Sewer Line	$825,612	Sewage Release
Sewer Gravity Line	27-inch Gravity Sewer Line	$335,188	Sewage Release
Sewer Gravity Line	30-inch Gravity Sewer Line	$179,035	Sewage Release
Sewer Gravity Line	30-inch Gravity Sewer Line	$3,355,172	Sewage Release

Name of Asset	Type	Replacement Value	Which Hazards Pose Risk
Sewer Gravity Line	30-inch Gravity Sewer Line	$115,465	Sewage Release
Sewer Gravity Line	33-inch Gravity Sewer Line	$577,395	Sewage Release
Sewer Gravity Line	33-inch Gravity Sewer Line	$83,614	Sewage Release
Sewer Gravity Line	33-inch Gravity Sewer Line	$1,963,259	Sewage Release
Sewer Gravity Line	36-inch Gravity Sewer Line	$107,060	Sewage Release
Sewer Gravity Line	36-inch Gravity Sewer Line	$1,747,666	Sewage Release
Sewer Gravity Line	36-inch Gravity Sewer Line	$2,851,775	Sewage Release
Sewer Gravity Line	36-inch Gravity Sewer Line	$332,640	Sewage Release
Sewer Gravity Line	36-inch Gravity Sewer Line	$130,438	Sewage Release
Sewer Gravity Line	48-inch Gravity Sewer Line	$78,466	Sewage Release
Sewer Force Main	4-inch Force Mains	$749,400	Sewage Release
Sewer Force Main	6-inch Force Mains	$857,925	Sewage Release
Sewer Force Main	8-inch Force Mains	$1,484,297	Sewage Release
Sewer Force Main	10-inch Force Mains	$479,236	Sewage Release
Sewer Force Main	12-inch Force Mains	$3,970,050	Sewage Release
Sewer Force Main	18-inch Force Mains	$531,244	Sewage Release
Sewer Force Main	20-inch Force Mains	$72,281	Sewage Release
Sewer Laterals	4-inch Service Laterals	$15,159,900	Sewage Release
Sewer Manholes	Sewer Manhole 5-Feet	$4,230,000	Sewage Release
Sewer Manholes	Sewer Manhole 10-Feet	$13,143,000	Sewage Release
Sewer Manholes	Sewer Manhole 15-Feet	$3,757,500	Sewage Release
Sewer Manholes	Sewer Manhole 20-Feet	$1,335,000	Sewage Release
Sewer Manholes	Sewer Manhole 25-Feet	$259,000	Sewage Release
Dollar Point	Lake Intake	$750,000	Drinking Water Outage, Sodium Hypochlorite Release
Grove Street	Lake Intake	$1,000,000	Drinking Water Outage, Sodium Hypochlorite Release
Cedar Point	Lake Intake	$750,000	Drinking Water Outage, Sodium Hypochlorite Release
McKinney	Lake Intake	$750,000	Drinking Water Outage, Sodium Hypochlorite Release
Chambers Ldg	Lake Intake	$750,000	Drinking Water Outage, Sodium Hypochlorite Release
Highlands I-III	Booster Pump Station	$625,000	Drinking Water Outage, Fire Flow Loss
Rocky Ridge I-II	Booster Pump Station	$625,000	Drinking Water Outage, Fire Flow Loss
Rubicon I-II	Booster Pump Station	$625,000	Drinking Water Outage, Fire Flow Loss
Tavern I-II	Booster Pump Station	$625,000	Drinking Water Outage, Fire Flow Loss
Granlibakken	Booster Pump Station	$625,000	Drinking Water Outage, Fire Flow Loss

Name of Asset	Type	Replacement Value	Which Hazards Pose Risk
Upper Highlands	Booster Pump Station	$625,000	Drinking Water Outage, Fire Flow Loss
Alpine Peaks	Water Tank	$700,000	Drinking Water Outage, Fire Flow Loss
Bunker	Water Tank	$700,000	Drinking Water Outage, Fire Flow Loss
Four Seasons	Water Tank	$700,000	Drinking Water Outage, Fire Flow Loss
Highlands	Water Tank	$700,000	Drinking Water Outage, Fire Flow Loss
Upper Highlands	Water Tank	$1,000,000	Drinking Water Outage, Fire Flow Loss
Rocky Ridge	Water Tank	$700,000	Drinking Water Outage, Fire Flow Loss
Rubicon II	Water Tank	$700,000	Drinking Water Outage, Fire Flow Loss
Rubicon III	Water Tank	$700,000	Drinking Water Outage, Fire Flow Loss
Tahoe Tavern	Water Tank	$700,000	Drinking Water Outage, Fire Flow Loss
Tahoe Hills	Water Tank	$700,000	Drinking Water Outage, Fire Flow Loss
Quail	Water Tank	$700,000	Drinking Water Outage, Fire Flow Loss
Timberland	Water Tank	$700,000	Drinking Water Outage, Fire Flow Loss
Madden Creek	Water Tank	$800,000	Drinking Water Outage, Fire Flow Loss
Tahoe Cedars	Water Tanks (2)	$1,500,000	Drinking Water Outage, Fire Flow Loss
Bunker	Water Well	$412,550	Drinking Water Outage, Fire Flow Loss, Chlorine Release
Tahoe City IV	Water Well	$1,500,000	Drinking Water Outage, Fire Flow Loss, Chlorine Release
Tahoe City II	Water Well	$1,500,000	Drinking Water Outage, Fire Flow Loss, Chlorine Release
Tahoe City III	Water Well	$1,500,000	Drinking Water Outage, Fire Flow Loss, Chlorine Release
Highlands A	Water Well	$1,295,000	Drinking Water Outage, Fire Flow Loss, Chlorine Release
Highlands B	Water Well	$1,295,000	Drinking Water Outage, Fire Flow Loss, Chlorine Release
Crystal Way	Water Well	$1,110,000	Drinking Water Outage, Fire Flow Loss, Chlorine Release
Rubicon 1	Water Well	$610,500	Drinking Water Outage, Fire Flow Loss, Chlorine Release
Rubicon 2	Water Well	$592,000	Drinking Water Outage, Fire Flow Loss, Chlorine Release
Rubicon 3	Water Well	$555,000	Drinking Water Outage, Fire Flow Loss, Chlorine Release
Tahoe Tavern	Water Well	$832,500	Drinking Water Outage, Fire Flow Loss, Chlorine Release
Timberland	Water Well	$800,000	Drinking Water Outage, Fire Flow Loss, Chlorine Release
Silver Street Well	Water Well	$800,000	Drinking Water Outage, Fire Flow Loss, Chlorine Release

Name of Asset	Type	Replacement Value	Which Hazards Pose Risk
Elm Street Well	Water Well	$1,000,000	Drinking Water Outage, Fire Flow Loss, Chlorine Release
Alpine Peaks	4-Inch Water Dist Line	$425,000	Drinking Water Outage, Fire Flow Loss
Alpine Peaks	6-Inch Water Dist Line	$1,725,000	Drinking Water Outage, Fire Flow Loss
Alpine Peaks	8-Inch Water Dist Line	$1,382,813	Drinking Water Outage, Fire Flow Loss
Alpine Peaks	10-Inch Water Dist Line	$1,068,281	Drinking Water Outage, Fire Flow Loss
Alpine Peaks	12-Inch Water Dist Line	$472,500	Drinking Water Outage, Fire Flow Loss
Comstock	4-Inch Water Dist Line	$900,000	Drinking Water Outage, Fire Flow Loss
Comstock	6-Inch Water Dist Line	$2,125,000	Drinking Water Outage, Fire Flow Loss
Dollar Point	2.5-Inch Water Dist Line	$80,000	Drinking Water Outage, Fire Flow Loss
Dollar Point	4-Inch Water Dist Line	$997,500	Drinking Water Outage, Fire Flow Loss
Dollar Point	6-Inch Water Dist Line	$5,900,000	Drinking Water Outage, Fire Flow Loss
Dollar Point	8-Inch Water Dist Line	$996,094	Drinking Water Outage, Fire Flow Loss
Highlands	4-Inch Water Dist Line	$205,500	Drinking Water Outage, Fire Flow Loss
Highlands	6-Inch Water Dist Line	$3,905,000	Drinking Water Outage, Fire Flow Loss
Highlands	8-Inch Water Dist Line	$31,875	Drinking Water Outage, Fire Flow Loss
Highlands	12-Inch Water Dist Line	$2,346,750	Drinking Water Outage, Fire Flow Loss
Chambers-McK	2.5-Inch Water Dist Line	$880,000	Drinking Water Outage, Fire Flow Loss
Chambers-McK	4-Inch Water Dist Line	$4,057,500	Drinking Water Outage, Fire Flow Loss
Chambers-McK	6-Inch Water Dist Line	$4,930,000	Drinking Water Outage, Fire Flow Loss
Chambers-McK	10-Inch Water Dist Line	$201,234	Drinking Water Outage, Fire Flow Loss
Chambers-McK	12-Inch Water Dist Line	$551,250	Drinking Water Outage, Fire Flow Loss
Dollar Condos 1&2	2.5-inch Water Dist Line	$87,500	Drinking Water Outage, Fire Flow Loss
Dollar Condos 1&2	4-inch Water Dist Line	$62,500	Drinking Water Outage, Fire Flow Loss
Dollar Condos 1&2	6-inch Water Dist Line	$87,500	Drinking Water Outage, Fire Flow Loss
Dollar Condos 1&2	12-inch Water Dist Line	$223,125	Drinking Water Outage, Fire Flow Loss
Granlibakken	4-inch Water Dist Line	$25,000	Drinking Water Outage, Fire Flow Loss
Granlibakken	6-Inch Water Dist Line	$125,000	Drinking Water Outage, Fire Flow Loss
Granlibakken	8-Inch Water Dist Line	$766,406	Drinking Water Outage, Fire Flow Loss
Granlibakken	10-Inch Water Dist Line	$549,047	Drinking Water Outage, Fire Flow Loss
Granlibakken	12-Inch Water Dist Line	$454,125	Drinking Water Outage, Fire Flow Loss
Highway 28	12-Inch Water Dist Line	$3,252,375	Drinking Water Outage, Fire Flow Loss
Highway 89	6-Inch Water Dist Line	$337,500	Drinking Water Outage, Fire Flow Loss
Highway 89	10-Inch Water Dist Line	$491,906	Drinking Water Outage, Fire Flow Loss
Highway 89	12-Inch Water Dist Line	$1,123,500	Drinking Water Outage, Fire Flow Loss
Meeks Bay Vista	2.5-inch Water Dist Line	$31,250	Drinking Water Outage, Fire Flow Loss
Meeks Bay Vista	6-Inch Water Dist Line	$1,606,250	Drinking Water Outage, Fire Flow Loss

Name of Asset	Type	Replacement Value	Which Hazards Pose Risk
Panorama	4-inch Water Dist Line	$260,000	Drinking Water Outage, Fire Flow Loss
Panorama	6-inch Water Dist Line	$1,947,500	Drinking Water Outage, Fire Flow Loss
Panorama	8-inch Water Dist Line	$4,688	Drinking Water Outage, Fire Flow Loss
Panorama	12-Inch Water Dist Line	$826,875	Drinking Water Outage, Fire Flow Loss
Rubicon	2.5-inch Water Dist Line	$785,000	Drinking Water Outage, Fire Flow Loss
Rubicon	4-inch Water Dist Line	$362,500	Drinking Water Outage, Fire Flow Loss
Rubicon	6-inch Water Dist Line	$9,353,750	Drinking Water Outage, Fire Flow Loss
Rubicon	8-inch Water Dist Line	$278,906	Drinking Water Outage, Fire Flow Loss
Star Harbor & Pomi	2.5-inch Water Dist Line	$287,500	Drinking Water Outage, Fire Flow Loss
Star Harbor & Pomi	6-Inch Water Dist Line	$100,000	Drinking Water Outage, Fire Flow Loss
Star Harbor & Pomi	8-Inch Water Dist Line	$51,563	Drinking Water Outage, Fire Flow Loss
Star Harbor & Pomi	10-Inch Water Dist Line	$211,172	Drinking Water Outage, Fire Flow Loss
Lake Forest Glen	2.5-inch Water Dist Line	$500,000	Drinking Water Outage, Fire Flow Loss
Lake Forest Glen	4-inch Water Dist Line	$112,500	Drinking Water Outage, Fire Flow Loss
Lake Forest Glen	6-inch Water Dist Line	$575,000	Drinking Water Outage, Fire Flow Loss
Lake Forest Glen	8-inch Water Dist Line	$539,063	Drinking Water Outage, Fire Flow Loss
N. Shore Condos	8-Inch Water Dist Line	$445,313	Drinking Water Outage, Fire Flow Loss
N. Shore Condos	10-Inch Water Dist Line	$397,500	Drinking Water Outage, Fire Flow Loss
N. Shore Condos	12-Inch Water Dist Line	$157,500	Drinking Water Outage, Fire Flow Loss
Rocky Ridge Condos	2.5-inch Water Dist Line	$470,000	Drinking Water Outage, Fire Flow Loss
Rocky Ridge Condos	6-inch Water Dist Line	$147,500	Drinking Water Outage, Fire Flow Loss
Rocky Ridge Condos	8-inch Water Dist Line	$414,844	Drinking Water Outage, Fire Flow Loss
Rocky Ridge Condos	10-Inch Water Dist Line	$1,055,859	Drinking Water Outage, Fire Flow Loss
St. Francis Condos	2.5-inch Water Dist Line	$167,500	Drinking Water Outage, Fire Flow Loss
St. Francis Condos	4-inch Water Dist Line	$112,500	Drinking Water Outage, Fire Flow Loss
St. Francis Condos	8-inch Water Dist Line	$539,063	Drinking Water Outage, Fire Flow Loss
St. Francis Condos	12-Inch Water Dist Line	$341,250	Drinking Water Outage, Fire Flow Loss
Tahoe City	2.5-inch Water Dist Line	$395,000	Drinking Water Outage, Fire Flow Loss
Tahoe City	4-inch Water Dist Line	$350,000	Drinking Water Outage, Fire Flow Loss
Tahoe City	6-inch Water Dist Line	$3,372,500	Drinking Water Outage, Fire Flow Loss
Tahoe City	8-inch Water Dist Line	$977,344	Drinking Water Outage, Fire Flow Loss
Tahoe City	10-Inch Water Dist Line	$186,328	Drinking Water Outage, Fire Flow Loss
Tahoe City	12-Inch Water Dist Line	$1,034,250	Drinking Water Outage, Fire Flow Loss
Tahoe Hills	2.5-inch Water Dist Line	$275,000	Drinking Water Outage, Fire Flow Loss
Tahoe Hills	4-inch Water Dist Line	$674,000	Drinking Water Outage, Fire Flow Loss
Tahoe Hills	6-inch Water Dist Line	$5,430,000	Drinking Water Outage, Fire Flow Loss

Name of Asset	Type	Replacement Value	Which Hazards Pose Risk
Tahoe Tavern Heights	2.5-inch Water Dist Line	$900,000	Drinking Water Outage, Fire Flow Loss
Tahoe Tavern Heights	4-inch Water Dist Line	$545,000	Drinking Water Outage, Fire Flow Loss
Tahoe Tavern Heights	6-inch Water Dist Line	$2,887,500	Drinking Water Outage, Fire Flow Loss
Tahoe Tavern Heights	8-inch Water Dist Line	$1,858,594	Drinking Water Outage, Fire Flow Loss
Tavern Shores Condo	2.5-inch Water Dist Line	$200,000	Drinking Water Outage, Fire Flow Loss
Tavern Shores Condo	4-inch Water Dist Line	$30,000	Drinking Water Outage, Fire Flow Loss
Tavern Shores Condo	6-inch Water Dist Line	$412,500	Drinking Water Outage, Fire Flow Loss
Villa's Condos	2.5-inch Water Dist Line	$75,000	Drinking Water Outage, Fire Flow Loss
Villa's Condos	6-inch Water Dist Line	$95,000	Drinking Water Outage, Fire Flow Loss
Villa's Condos	8-inch Water Dist Line	$747,656	Drinking Water Outage, Fire Flow Loss
Tahoe Tavern Condos	2.5-inch Water Dist Line	$375,000	Drinking Water Outage, Fire Flow Loss
Tahoe Tavern Condos	4-inch Water Dist Line	$50,000	Drinking Water Outage, Fire Flow Loss
Tahoe Tavern Condos	6-inch Water Dist Line	$650,000	Drinking Water Outage, Fire Flow Loss
Tahoe Tavern Condos	8-inch Water Dist Line	$421,875	Drinking Water Outage, Fire Flow Loss
Tahoe Tavern Condos	10-Inch Water Dist Line	$37,266	Drinking Water Outage, Fire Flow Loss
Tamarack MW	6-inch Water Dist Line	$147,500	Drinking Water Outage, Fire Flow Loss
Tamarack MW	8-inch Water Dist Line	$1,155,469	Drinking Water Outage, Fire Flow Loss
T-T Forest Track	2.5-inch Water Dist Line	$200,000	Drinking Water Outage, Fire Flow Loss
T T Forest Track	6-inch Water Dist Line	$225,000	Drinking Water Outage, Fire Flow Loss
T T Forest Track	8-inch Water Dist Line	$585,938	Drinking Water Outage, Fire Flow Loss
Tahoe Cedars Water System	8-12 inch Water Dist Line	$25,500,000	Drinking Water Outage, Fire Flow Loss
Madden Creek Water System	8-12 inch Water Dist Line	$7,800,000	Drinking Water Outage, Fire Flow Loss
Timberland Water System	8-inch Water Dist Line	$2,400,000	Drinking Water Outage, Fire Flow Loss
Total		**$62,209,892**	

Source: TCPUD

Populations Served

Also potentially at risk should the District be affected by natural hazard events are the populations served by the District. TCPUD provides services to approximately 15,000 full time residents. Seasonal populations can increase to over 50,000 residents at times during peak summer months such as July.

Natural Resources

TCPUD has a variety of natural resources of value to the District. These natural resources parallel that of the Tahoe Area of Placer County as a whole. Information can be found in Section 4.3.1 of the Base Plan.

Historic and Cultural Resources

TCPUD has a variety of historic and cultural resources of value to the District. These historic and cultural resources parallel that of the Tahoe Area of Placer County as a whole. Information can be found in Section 4.3.1 of the Base Plan.

Growth and Development Trends

Due to specific development restrictions within the Lake Tahoe Basin, typical growth within the District boundaries is less than one half percent (0.5%) annually.

Development since 2016

No District facilities have been constructed since 2016.

Future Development

The District has no control over future development in areas the District services. Future development in these areas parallels that of the Tahoe Area of Placer County Planning Area. More general information on growth and development in Placer County as a whole can be found in "Growth and Development Trends" in Section 4.3.1 Placer County Vulnerability and Assets at Risk of the Base Plan.

W.5.3. Vulnerability to Specific Hazards

This section provides the vulnerability assessment, including any quantifiable loss estimates, for those hazards identified above in Table W-3 as high or medium significance hazards. Impacts of past events and vulnerability of the District to specific hazards are further discussed below (see Section 4.1 Hazard Identification in the Base Plan for more detailed information about these hazards and their impacts on the Placer County Planning Area). Methodologies for evaluating vulnerabilities and calculating loss estimates are the same as those described in Section 4.3 of the Base Plan.

An estimate of the vulnerability of the District to each identified priority hazard, in addition to the estimate of likelihood of future occurrence, is provided in each of the hazard-specific sections that follow. Vulnerability is measured in general, qualitative terms and is a summary of the potential impact based on past occurrences, spatial extent, and damage and casualty potential. It is categorized into the following classifications:

- **Extremely Low**—The occurrence and potential cost of damage to life and property is very minimal to nonexistent.
- **Low**—Minimal potential impact. The occurrence and potential cost of damage to life and property is minimal.
- **Medium**—Moderate potential impact. This ranking carries a moderate threat level to the general population and/or built environment. Here the potential damage is more isolated and less costly than a more widespread disaster.
- **High**—Widespread potential impact. This ranking carries a high threat to the general population and/or built environment. The potential for damage is widespread. Hazards in this category may have occurred in the past.

- **Extremely High**—Very widespread with catastrophic impact.

Depending on the hazard and availability of data for analysis, this hazard specific vulnerability assessment also includes information on values at risk, critical facilities and infrastructure, populations at risk, and future development.

Avalanche

Likelihood of Future Occurrence–Likely
Vulnerability–High

Hazard Profile and Problem Description

According to the Sierra Avalanche Center, avalanches occur when loading of new snow increases stress at a rate faster than strength develops, and the slope fails. Avalanches are a rapid down-slope movement of snow, ice and debris triggered by ground shaking, sound, or human or animal movement. Avalanches consist of a starting zone where the ice or snow breaks loose, a track which is the grade or channel the debris slides down and a run-out zone where the snow is deposited.

Critical stresses develop more quickly on steeper slopes and where deposition of wind-transported snow is common. The vast majority of avalanches occur during and shortly after storms. This hazard generally affects a small number of people, such as snowboarders, skiers, and hikers who venture into backcountry areas during or after winter storms. Roads and highway closures, damaged structures, and destruction of forests are also a direct result of avalanches.

Location and Extent

The two primary factors impacting avalanche activity are weather and terrain. Large, frequent storms deposit snow on steep slopes to create avalanche hazards. Additional factors that contribute to slope stability are the amount of snow, rate of accumulation, moisture content, wind speed and direction and type of snow crystals. Topography also plays a vital role in avalanche dynamics. Slope angles between 30 to 45 degrees are optimal for avalanches. The risk of avalanches decreases on slope angles below 30 degrees. At 50 or more degrees they tend to produce sluff or loose snow avalanches that account for only a small percentage of avalanche deaths and property damage annually.

Areas prone to avalanche hazards include hard to access areas deep in the backcountry and those in the more developed higher elevations of the County in the Tahoe basin. Avalanche hazards exist in eastern Placer County where combinations of the above criteria occur.

Historically, avalanches occur within the eastern portion of the county, between the months of December and March following snowstorms. According to the Placer County EOP, areas where the potential for avalanches to occur are zoned as moderate or high avalanche hazard zones and have been identified using maps available at the Placer County Planning Department. Areas of particular concern within the District include: West shore of Lake Tahoe (Homewood & Ward Creek Tract) and the Truckee River Corridor/Highway 89 Corridor.

Past Occurrences

There have been no state or federal disasters in the County related to avalanche. There are no known fatalities or significant damage to the built environment due to avalanches occurring within District boundaries. Damages from historic avalanches have primarily involved impacts to roads and damages to trails and other natural areas.

Vulnerability to and Impacts from Avalanche

Avalanches occur when the weight of new snow increases stress faster than strength of the snowpack develops, causing the slope to fail. Avalanche conditions develop more quickly on steeper slopes (located in the eastern portions of the County) and where wind-blown snow is common. Avalanche impacts vary, but include risk to property, injury, or death. Avalanches generally affect a few snowboarders, skiers, and hikers who venture into backcountry areas during or after winter storms. Avalanches cause road closures, and can damage structures and forests.

Assets at Risk

All water and sewer facilities located within Avalanche zones.

Dam Failure

Likelihood of Future Occurrence–Unlikely
Vulnerability–Medium

Hazard Profile and Problem Description

Dams are manmade structures built for a variety of uses including flood protection, power generation, agriculture, water supply, and recreation. When dams are constructed for flood protection, they are usually engineered to withstand a flood with a computed risk of occurrence. For example, a dam may be designed to contain a flood at a location on a stream that has a certain probability of occurring in any one year. If prolonged periods of rainfall and flooding occur that exceed the design requirements, that structure may be overtopped or fail. Overtopping is the primary cause of earthen dam failure in the United States.

Location and Extent

Dam failure is a natural disaster from two perspectives. First, the inundation from released waters resulting from dam failure is related to naturally occurring floodwaters. Second, a total dam failure would most probably happen as a consequence of the natural disaster triggering the event, such as an earthquake. There is no scale with which to measure dam failure. However, Cal DWR Division of Safety of Dams (DOSD) assigns hazard ratings to dams within the State that provides information on the potential impact should a dam fail. The following two factors are considered when assigning hazard ratings: existing land use and land use controls (zoning) downstream of the dam. Dams are classified in four categories that identify the potential hazard to life and property: Low, Significant, High, and Extremely High. These were discussed in more detail in Section 4.3.9 of the Base Plan.

While a dam may fill slowly with runoff from winter storms, a dam break has a very quick speed of onset. The duration of dam failure is generally not long – only as long as it takes to empty the reservoir of water the dam held back. The District would be affected for as long as the flood waters from the dam failure took to drain downstream.

Past Occurrences

There has been no federal or state disaster declarations for dam failure in the County. The District noted no other dam failure occurrences that have affected the District.

Vulnerability to and Impacts from Dam Failure

Dam failure flooding would vary by community depending on which dam fails and the nature and extent of the dam failure and associated flooding. Impacts to the District from a dam failure flood could include loss of life and injury, flooding and damage to property and structures, damage to critical facilities and infrastructure, loss of natural resources, and all other flood related impacts. Additionally, mass evacuations and associated economic losses can also be significant.

Vulnerability to dam failures is generally confined to the areas subject to inundation downstream of the facility. Based on analysis provided in the Placer County General Plan Background Report, only four dams within Placer County have the potential to affect more than 100 persons. Of these four, a failure of the Lake Tahoe Dam (outlet on the Truckee River) could potentially impact areas within the TCPUD. Failure of this dam would be contained within the Truckee River floodway to Nevada County and could impact in excess of 1,000 people.

Assets at Risk

All water and sewer facilities located within the Truckee River Floodway.

Drought & Water Shortage

Likelihood of Future Occurrence–Likely
Vulnerability–High

Hazard Profile and Problem Description

Drought is a complex issue involving many factors—it occurs when a normal amount of precipitation and snow is not available to satisfy an area's usual water-consuming activities. Drought can often be defined regionally based on its effects. Drought is different than many of the other natural hazards in that it is not a distinct event and usually has a slow onset. Drought can severely impact a region both physically and economically. Drought affects different sectors in different ways and with varying intensities. Adequate water is the most critical issue and is critical for agriculture, manufacturing, tourism, recreation, and commercial and domestic use. As the population in the area continues to grow, so will the demand for water.

Location and Extent

Drought and water shortage are regional phenomenon. The whole of the County, as well as the whole of the District, is at risk. The US Drought Monitor categorizes drought conditions with the following scale:

- None
- D0 – Abnormally dry
- D1 – Moderate Drought
- D2 – Severe Drought
- D3 – Extreme drought
- D4 – Exceptional drought

Drought has a slow speed of onset and a variable duration. Drought can last for a short period of time, which does not usually affect water shortages and for longer periods. Should a drought last for a long period of time, water shortage becomes a larger issue. Current drought conditions in the District and the County are shown in Section 4.3.10 of the Base Plan.

Past Occurrences

There has been one state and one federal disaster declaration due to drought since 1950. This can be seen in Table W-5.

Table W-5 Placer County – State and Federal Disaster Declarations Summary 1950-2020

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Drought	1	2014	1	1977

Source: Cal OES, FEMA

Since drought is a regional phenomenon, past occurrences of drought for the District are the same as those for the County and includes 5 multi-year droughts over an 85-year period. Details on past drought occurrences can be found in Section 4.3.10 of the Base Plan.

Vulnerability to and Impacts from Drought and Water Shortage

Based on historical information, the occurrence of drought in California, including the District, is cyclical, driven by weather patterns. Drought has occurred in the past and will occur in the future. Periods of actual drought with adverse impacts can vary in duration, and the period between droughts can be extended. Although an area may be under an extended dry period, determining when it becomes a drought is based on impacts to individual water users. Drought impacts are wide-reaching and may be economic, environmental, and/or societal. Tracking drought impacts can be difficult.

The most significant qualitative impacts associated with drought in the Placer County Planning Area are those related to water intensive activities such as agriculture, wildfire protection, municipal usage, commerce, tourism, recreation, and wildlife preservation. Mandatory conservation measures are typically implemented during extended droughts. Drought conditions can also cause soil to compact and not absorb water well, potentially making an area more susceptible to flooding. With a reduction in water, water

supply issues based on water rights becomes more evident. Climate change may create additional impacts to drought and water shortage in the County and the District.

During periods of drought, vegetation can dry out which increases fire risk. Drought that occurs during periods of extreme heat and high winds can cause Public Safety Power Shutoff (PSPS) events to be declared in the County. More information on power shortage and failure can be found in the Severe Weather: Extreme Heat Section below, as well as in Section 4.3.2 of the Base Plan.

The impact of a drought on the District is primarily one of water supply. All water provided by the TCPUD comes from deep groundwater wells located in various locations in the Lake Tahoe Basin. Continued drought can severely compromise the water supply within the district. Most recently, after multiple years of below-average rainfall and very low snow-melt run off, Governor Brown in signed emergency regulations into place in 2015 requiring all of California to reduce water use by 25%. TCPUD has adopted Ordinance 284, Water Conservation and Drought Response Standards since the last LHMP and has been actively working with customers to meet the State mandates.

Assets at Risk

All groundwater wells within the District.

Earthquake

Likelihood of Future Occurrence–Occasional
Vulnerability–High

Hazard Profile and Problem Description

An earthquake is caused by a sudden slip on a fault. Stresses in the earth's outer layer push the sides of the fault together. Stress builds up, and the rocks slip suddenly, releasing energy in waves that travel through the earth's crust and cause the shaking that is felt during an earthquake. Earthquakes can cause structural damage, injury, and loss of life, as well as damage to infrastructure networks, such as water, power, gas, communication, and transportation. Earthquakes may also cause collateral emergencies including dam and levee failures, seiches, hazmat incidents, fires, avalanches, and landslides. The degree of damage depends on many interrelated factors. Among these are: the magnitude, focal depth, distance from the causative fault, source mechanism, duration of shaking, high rock accelerations, type of surface deposits or bedrock, degree of consolidation of surface deposits, presence of high groundwater, topography, and the design, type, and quality of building construction.

Location and Extent

The amount of energy released during an earthquake is usually expressed as a magnitude and is measured directly from the earthquake as recorded on seismographs. An earthquake's magnitude is expressed in whole numbers and decimals (e.g., 6.8). Seismologists have developed several magnitude scales, as discussed in Section 4.3.11 of the Base Plan. Placer County itself is traversed by a series of northwest-trending faults, called the Foothill Fault Zone, that are related to the Sierra Nevada uplift. This was the source of Oroville's 1975 earthquake (and an earlier event in the 1940s). Subsequent research of these

events led to the identification and naming of the zone and questions about the siting and design of the proposed Auburn Dam. Earthquakes on nearby fault segments in the zone could be the source of ground shaking in the Placer County Planning Area.

Although portions of western and eastern Placer County are located in a seismically active region, no known faults actually go through any of the cities or towns. However, the Bear Mountain and the Melones faults are situated approximately three to four miles west and east of the City of Auburn respectively. Earthquakes on these two faults would have the greatest potential for damaging buildings in Auburn, especially the unreinforced masonry structures in the older part of the city and homes built before 1960 without adequate anchorage of framing and foundations. Similar lower magnitude but nearby earthquakes are capable of producing comparable damages in other Placer County communities.

Another measure of earthquake severity is intensity. Intensity is an expression of the amount of shaking at any given location on the ground surface. Seismic shaking is typically the greatest cause of losses to structures during earthquakes. Seismic shaking maps for the area show Placer County and the District fall within a moderate shake risk.

Past Occurrences

There have be no past federal or state disaster declarations from this hazard. In 2003/2004, volcanic magma migrating about 20 miles below the surface of the Sierra Nevada Mountains caused a swarm of about 1,600 small earthquakes. Since February of 2008, more than 600 earthquakes of magnitude greater than 1.0 have been recorded in nearby Reno, Nevada, with the most powerful one recorded at 4.7 magnitude. It is unknown to what extent these earthquakes were felt by residents in the Tahoe area, but clearly the District lies within a seismically active area.

Vulnerability to and Impacts from Earthquake

The combination of plate tectonics and associated California coastal mountain range building geology generates earthquake as a result of the periodic release of tectonic stresses. Placer County lies in the center of the North American and Pacific tectonic plate activity. There have been earthquakes as a result of this activity in the historic past, and there will continue to be earthquakes in the future of the California north coastal mountain region. Extreme eastern Placer County borders the Basin and Range province that entails most of Nevada and western Utah. This area is riddled with active faults that are responsible for and form the boundary between each basin or valley and the neighboring mountain range.

Fault ruptures itself contributes very little to damage unless the structure or system element crosses the active fault; however, liquefaction can occur further from the source of the earthquake. In general, newer construction is more earthquake resistant than older construction due to enforcement of improved building codes. Manufactured buildings can be very susceptible to damage because their foundation systems are rarely braced for earthquake motions. Locally generated earthquake motions and associated liquefaction, even from very moderate events, tend to be more damaging to smaller buildings, especially those constructed of unreinforced masonry (URM) and soft story buildings. There are no URM buildings in the District.

The Uniform Building Code (UBC) identifies four seismic zones in the United States. The zones are numbered one through four, with Zone 4 representing the highest level of seismic hazard. The UBC establishes more stringent construction standards for areas within Zones 3 and 4. All of California lies within either Zone 3 or Zone 4. The TCPUD is within the less hazardous Zone 3.

Impacts from earthquake in the District will vary depending on the fault that the earthquake occurs on, the depth of the earthquake strike, and the intensity of shaking. Large events could cause damages to infrastructure, critical facilities, residential and commercial properties, and possible injuries or loss of life.

Assets at Risk

All water and sewer assets are vulnerable to earthquakes, including above ground and below ground structures and pipelines.

Flood: 1%/0.2% Annual Chance

Likelihood of Future Occurrence–Occasional/Unlikely
Vulnerability–Medium/High

Hazard Profile and Problem Description

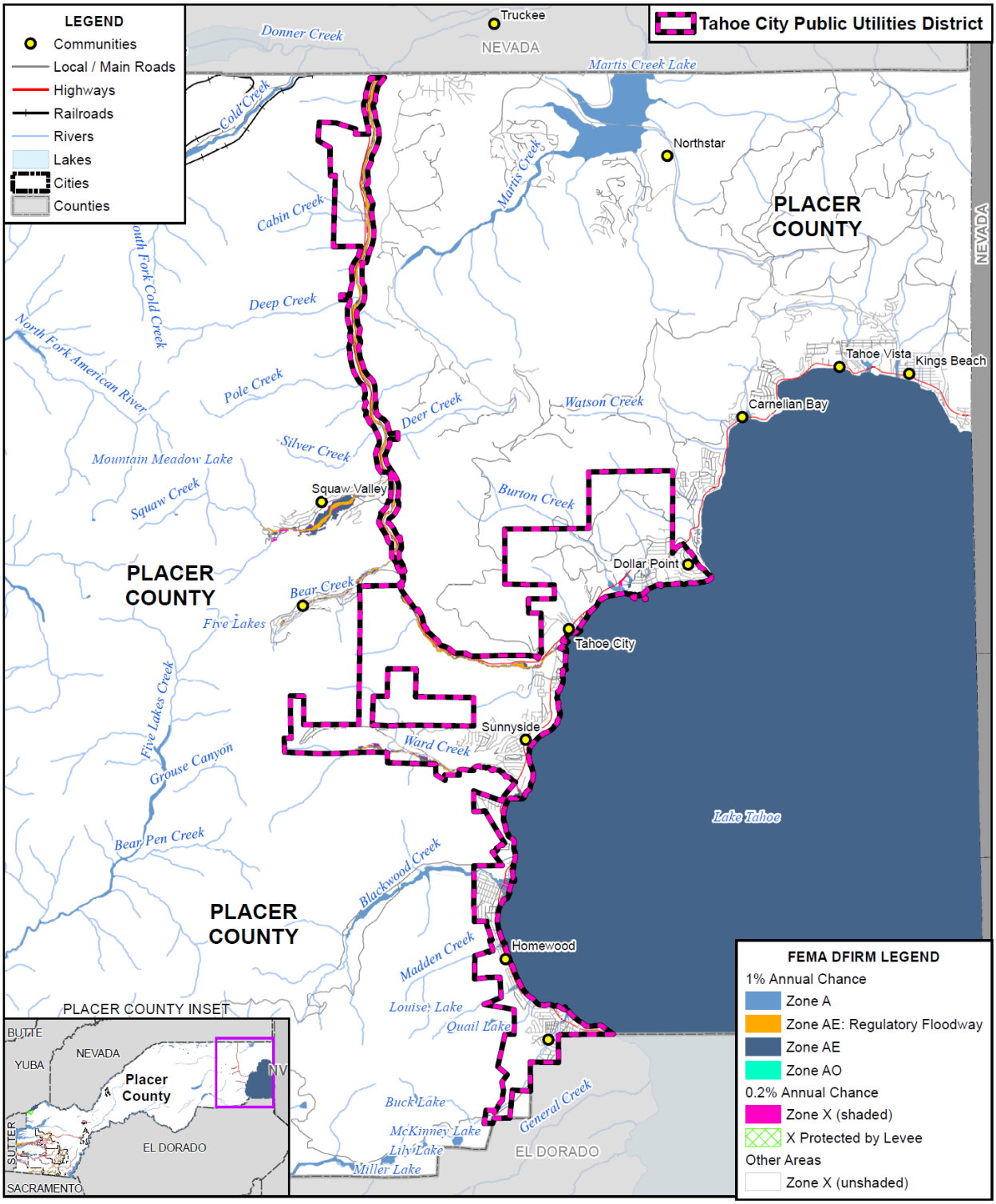
This hazard analyzes the FEMA DFIRM 1% and 0.2% annual chance floods. These tend to be the larger floods that can occur in the County or in the District, and have caused damages in the past. Flooding is a significant problem in Placer County and the District. Historically, the District has been at risk to flooding primarily during the winter and spring months when river systems in the County swell with heavy rainfall and snowmelt runoff. Normally, storm floodwaters are kept within defined limits by a variety of storm drainage and flood control measures. Occasionally, extended heavy rains result in floodwaters that exceed normal high-water boundaries and cause damage.

As previously described in Section 4.3.12 of the Base Plan, the Placer County Planning Area and the TCPUD have been subject to historical flooding.

Location and Extent

The TCPUD has areas located in the 1% annual chance floodplain. This is seen in Figure W-2.

Figure W-2 TCPUD – FEMA DFIRM Flood Zones



Data Source: FEMA DFIRM 11/2/2018, Placer County GIS, Cal-Atlas, NVBLM; Map Date: 2021.

Table W-6 details the DFIRM mapped flood zones within the 1% annual chance flood zone as well as other flood zones located within the District.

Table W-6 TCPUD– DFIRM Flood Hazard Zones

Flood Zone	Description	Flood Zone Present in the District
A	Areas subject to inundation by the 1% annual-chance flood event generally determined using approximate methodologies. Because detailed hydraulic analyses have not been performed, no Base Flood Elevations (BFEs) or flood depths are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply.	X
AE	Areas subject to inundation by the 1% annual-chance flood event determined by detailed methods. Base Flood Elevations (BFEs) are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply.	
AE – Regulatory Floodway	Areas subject to inundation by the 1% annual-chance flood event determined by detailed methods. Base Flood Elevations (BFEs) are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply. Different from AE in that it adds the water course and adjacent lands that must be reserved in order to discharge the base flood without increasing the water surface elevation by more than one foot.	
AH	An area inundated by 1% annual chance flooding (usually an area of ponding), for which BFEs have been determined; flood depths range from 1 to 3 feet	
AO	Areas subject to inundation by 100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are between one and three feet	
Shaded X	500-year flood the areas between the limits of the 1% annual chance flood and the 0.2-percent-annual-chance (or 500-year) flood	
X Protected by Levee	An area determined to be outside the 500-year flood and protected by levee from 100-year flood	
X	Areas outside of known floodplains.	X

Source: FEMA

Additionally, flood extents can generally be measured in volume, velocity, and depths of flooding. Expected flood depths in the District vary, depending on the nature and extent of a flood event; specific depths are unknown. Flood durations in the District tend to be short to medium term, or until either the storm drainage system can catch up or flood waters move downstream. Flooding in the District tends to have a shorter speed of onset, due to the amount of water that flows through the District.

Past Occurrences

A list of state and federal disaster declarations for Placer County from flooding is shown on Table W-7. These events also likely affected the District to some degree.

Table W-7 Placer County – State and Federal Disaster Declarations from Flood 1950-2020

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Flood (including heavy rains and storms)	16	1950, 1955, 1958 (twice), 1962, 1963, 1969, 1973, 1980, 1983, 1986, 1995 (twice), 1997, 2008, 2017	13	1955, 1958, 1962, 1964, 1969, 1983, 1986, 1995 (twice), 1997, 2006 (twice), 2017

Source: Cal OES, FEMA

Events that affected the District include:

- In **late 1996** to **early 1997**, flooding of the Lower Truckee River occurred along Highway 89. Known damages included those to storm drainage coverts. Bike trails also were washed out along the highway. A federal disaster declaration was declared for these floods.
- Also occurring in **2006** was flooding of the Blackwood Sewer Station. Flooding caused extensive erosion of the riverbanks. To prevent further damage, sandbags were used, and a large snow barrier was built to protect the station and the banks of the river. A federal disaster declaration was also declared for these floods. Currently, the District is working on retrofitting the building and repairing the riverbanks. Flood mitigation measures have been completed to protect this station in the event of flooding.
- **January 6-23, 2017, February 8-26, 2017** – Significant snowfall and flooding from winter storms hit the District. Runoff and erosion of parks facilities, as well as damage turf facilities occurred. Excessive snow removal costs for structures, erosion, and turf replacement were borne by the District. Diesel fuel costs for generator operation due to power outages were also borne. Electrical pump controls were damaged. A review of FEMA claims included damages of $558,206 to the District. FEMA helped to defray $203,110 of these costs.

Vulnerability to and Impacts from Flood

Floods have been a part of the District's historical past and will continue to be so in the future. During winter months, long periods of precipitation and the timing of that precipitation are critical in determining the threat of flood, and these characteristics further dictate the potential for widespread structural and property damages. Predominantly, the effects of flooding are generally confined to areas near the waterways of the County. As waterways grow in size from local drainages, so grows the threat of flood and dimensions of the threat. This threatens structures in the floodplain. Structures can also be damaged from trees falling as a result of water-saturated soils. Electrical power outages happen, and the interruption of power causes major problems. Loss of power is usually a precursor to closure of governmental offices and community businesses. Roads can be damaged and closed, causing safety and evacuation issues. People may be swept away in floodwaters, causing injuries or deaths.

Floods are among the costliest natural disasters in terms of human hardship and economic loss nationwide. Floods can cause substantial damage to structures, landscapes, and utilities as well as life safety issues. Floods can be extremely dangerous, and even six inches of moving water can knock over a person given a strong current. During a flood, people can also suffer heart attacks or electrocution due to electrical equipment short outs. Floodwaters can transport large objects downstream which can damage or remove stationary structures. Ground saturation can result in instability, collapse, or other damage. Objects can also be buried or destroyed through sediment deposition. Floodwaters can also break utility lines and

interrupt services. Standing water can cause damage to crops, roads, foundations, and electrical circuits. Direct impacts, such as drowning, can be limited with adequate warning and public education about what to do during floods. Other problems connected with flooding and stormwater runoff include erosion, sedimentation, degradation of water quality, loss of environmental resources, and economic impacts.

Assets at Risk

All water and sewer assets are vulnerable to flood, including above ground structures and below ground infrastructure.

Flood: Localized Stormwater Flooding

Likelihood of Future Occurrence–Likely
Vulnerability– Medium/High

Hazard Profile and Problem Description

Flooding occurs in areas other than the FEMA mapped 1% and 0.2% annual chance floodplains. Flooding may be from drainages not studied by FEMA, lack of or inadequate drainage infrastructure, or inadequate maintenance. Localized, stormwater flooding occurs throughout the County during the rainy season from November through April. Prolonged heavy rainfall contributes to a large volume of runoff resulting in high peak flows of moderate duration.

Location and Extent

The TCPUD is subject to localized flooding throughout the District. Flood extents are usually measured in areas affected, velocity of flooding, and depths of flooding. Expected flood depths in the District vary by location. Flood durations in the District tend to be short to medium term, or until either the storm drainage system can catch up or flood waters move downstream. Localized flooding in the District tends to have a shorter speed of onset, especially when antecedent rainfall has soaked the ground and reduced its capacity to absorb additional moisture.

The District tracks localized flooding areas. localized flood areas identified by the TCPUD are summarized in Table W-8.

Table W-8 TCPUD – List of Localized Flooding Problem Areas

Area Name	Flooding	Pavement Deterioration	Washout	High Water	Landslide/ Mudslide	Debris	Downed Trees
McKinney Creek Drainage	X	X	X	X		X	X
Blackwood Creek Drainage	X	X	X	X		X	X
Burton Creek Drainage	X	X	X	X		X	X
Polaris Creek Drainage	X	X	X	X		X	X

Source: TCPUD

Past Occurrences

There have been no federal or state disaster declarations in the County due to localized flooding. The District noted the following past occurrences of localized flooding:

- **January 6-23, 2017, February 8-26, 2017** – Significant snowfall and flooding from winter storms hit the District. Runoff and erosion of parks facilities, as well as damage turf facilities occurred. Excessive snow removal costs for structures, erosion, and turf replacement were borne by the District. Diesel fuel costs for generator operation due to power outages were also borne. Electrical pump controls were damaged. A review of FEMA claims included damages of $558,206 to the District. FEMA helped to defray $203,110 of these costs.

Vulnerability to and Impacts from Localized Flooding

Primary concerns associated with stormwater flooding include life safety issues, and impacts to property and to infrastructure that provides a means of ingress and egress throughout the community. Ground saturation can result in instability, collapse, or other damage to trees, structures, roadways and other critical infrastructure. Objects can also be buried or destroyed through sediment deposition. Floodwaters can break utility lines and interrupt services. Standing water can cause damage to crops, roads, and foundations. Other problems connected with flooding and stormwater runoff include erosion, sedimentation, degradation of water quality, losses of environmental resources, and certain health hazards.

Assets at Risk

All water and sewer assets are vulnerable to flood, including above ground structures and below ground infrastructure.

Landslide, Mudslide, Debris Flows

Likelihood of Future Occurrence–Likely
Vulnerability– Medium/High

Hazard Profile and Problem Description

According to the California Geological Survey, landslides refer to a wide variety of processes that result in the perceptible downward and outward movement of soil, rock, and vegetation under gravitational influence. Common names for landslide types include slump, rockslide, debris slide, lateral spreading, debris avalanche, earth flow, and soil creep. Landslides may be triggered by both natural and human-induced changes in the environment that result in slope instability.

The susceptibility of an area to landslides depends on many variables including steepness of slope, type of slope material, structure and physical properties of materials, water content, amount of vegetation, and proximity to areas undergoing rapid erosion or changes caused by human activities. These activities include mining, construction, and changes to surface drainage areas. Landslide events can be determined by the composition of materials and the speed of movement. A rockfall is dry and fast while a debris flow is wet and fast. Regardless of the speed of the slide, the materials within the slide, or the amount of water present in the movement, landslides are a serious natural hazard.

Debris flows, can also occur in some areas of the County and the District. These debris flows generally occur in the immediate vicinity of existing drainage swales or steep ravines. Debris flows occur when near surface soil in or near steeply sloping drainage swales becomes saturated during unusually heavy precipitation and begins to flow downslope at a rapid rate. Debris flows are also common during the rainy season in post fire areas.

Location and Extent

Landslides, mudslides, and debris flows can affect certain areas of the District. The CGS has estimated that the risk varies across the District and has created maps showing risk variance. This risk variance falls into multiple categories. These are discussed in Section 4.3.14 of the Base Plan. According to the District Planning Team, risk varies within the District range from medium to high. The speed of onset of landslide is often short, especially in post-wildfire burn scar areas, but it can also take years for a slope to fail. Landslide duration is usually short, though digging out and repairing landslide areas can take some time.

Past Occurrences

There have been no federal or state disaster declarations in the County from landslide. The District Planning Team noted the following past occurrences of landslides.

- During the storms and flooding in December of 2006, land sliding occurred in the Truckee River corridor along Highway 89 and associated bike trail. Damages for repairs were estimated at $355,000.

Vulnerability to and Impacts from Landslide

Although landslides are primarily associated with slopes greater than 15 percent, they can also occur in relatively flat areas and as cut-and-fill failures, river bluff failures, lateral spreading landslides, collapse of wine-waste piles, failures associated with quarries, and open-pit mines. Landslides may be triggered by both natural- and human-caused activity.

Impacts in the District may be to structures, infrastructure, and to life safety. Impacts from landslide, mudslides and debris flow in the District, include damage to water and sewer infrastructure, and transportation interruption.

Assets at Risk

All water and sewer assets are vulnerable to flood, including above ground structures and below ground infrastructure.

Seiche

Likelihood of Future Occurrence–Unlikely
Vulnerability– Medium

Hazard Profile and Problem Description

U.S. Army Corps of Engineers defines seiche as:

- A standing wave oscillation of an enclosed water body that continues, pendulum fashion, after the cessation of the originating force, which may have been either seismic or atmospheric.
- An oscillation of a fluid body in response to a disturbing force having the same frequency as the natural frequency of the fluid system. Tides are now considered to be seiches induced primarily by the periodic forces caused by the sun and moon.
- In the Great Lakes area, any sudden rise in the water of a harbor or a lake whether or not it is oscillatory (although inaccurate in a strict sense, this usage is well established in the Great Lakes area).

Seiches can be generated when the water is subject to changes in wind or atmospheric pressure gradients or, in the case of semi-enclosed basins, by the oscillation of adjacent connected water bodies having a periodicity close to that of the seiche or of one of its harmonics. Other, less frequent causes of seiches include heavy precipitation over a portion of the lake, flood discharge from rivers, seismic disturbances, submarine mudslides or slumps, and tides. The most dramatic seiches have been observed after earthquakes and large landslide events.

Location and Extent

Within Placer County, locations with the highest probability of impact are shore areas of Lake Tahoe from 0 to 30 feet above mean lake water level. Speed of onset of seiche is short. The duration of the event tends to be short as well, continuing until the waves naturally dissipate.

Past Occurrences

There have been no state or federal disasters in the County related to seiche. No events of past seiche have affected the District.

Vulnerability to and Impacts from Seiche

Research from the University of Nevada estimates that an earthquake must be at least a magnitude 6.5 to cause a damaging seiche at Lake Tahoe. The two faults directly underneath the lake are considered capable of generating magnitude 7.1 earthquakes. Computer models of seiche activity at Lake Tahoe prepared by the University of Nevada research team estimate that waves as high as 30 feet could strike the shore. These projections suggest largest waves might hit Sugar Pine Point, Rubicon Point and the casinos in South Lake Tahoe. The seiche risk is potentially devastating as hundreds of houses are built along the lake and more than 17,000 people enjoy the Lake Tahoe shoreline every day in the summer.

Assets at Risk

All water and sewer infrastructure located within approximately 30 feet above mean lake water level.

Severe Weather: Freeze and Snow

Likelihood of Future Occurrence–Highly Likely
Vulnerability–Medium

Hazard Profile and Problem Description

According to the NWS and the WRCC, winter snowstorms can include heavy snow, ice, and blizzard conditions. Heavy snow can immobilize a region, stranding commuters, stopping the flow of supplies, and disrupting emergency and medical services. Accumulations of snow can collapse roofs and knock down trees and power lines. In rural areas, homes and farms may be isolated for days, and unprotected livestock may be lost. The cost of snow removal, damage repair, and business losses can have a tremendous impact on cities and towns.

Heavy accumulations of ice can bring down trees, electrical wires, telephone poles and lines, and communication towers. Communications and power can be disrupted for days until the damage can be repaired. Power outages can have a significant impact on communities, especially critical facilities such as public utilities. Even small accumulations of ice may cause extreme hazards to motorists and pedestrians.

Some winter storms are accompanied by strong winds, creating blizzard conditions with blinding wind-driven snow, severe drifting, and dangerous wind chills. Strong winds accompanying these intense storms and cold fronts can knock down trees, utility poles, and power lines. Blowing snow can reduce visibility to only a few feet in areas where there are no trees or buildings. Serious vehicle accidents with injuries and deaths can result. Freezing temperatures can cause significant damage to the agricultural industry.

Location and Extent

Freeze and snow are regional issues, meaning the entire District is at risk to cold weather and freeze events. While there is no scale (i.e. Richter, Enhanced Fujita) to measure the effects of freeze, the WRCC reports that in a typical year, minimum temperatures fall below 32°F on 209.0 days with 0.4 days falling below 0°F in eastern Placer County. Snowfall is measured in depths, and the WRCC reports that average snowfall on the eastern side of the County is 190.7 inches. Freeze and snow has a slow onset and can generally be predicted in advance for the County. Freeze events can last for hours (in a cold overnight), or for days to weeks at a time. Snow event can last for hours or days, and the snow stays all winter in the eastern portion of the County, often with significant snow depths.

Past Occurrences

There has been no federal and one state disaster declarations in the County for freeze and snow, as shown on Table W-9.

Table W-9 Placer County – State and Federal Disaster Declarations from Freeze and Snow 1950-2020

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Freeze	1	1972	0	–

Source: Cal OES, FEMA

The District noted that cold and freeze is a regional phenomenon; events that affected the County also affected the District. Those past occurrences were shown in the Base Plan in Section 4.3.3. Specific events the District could recall include:

- During the storms of **December 2006** was a power outage in the Tahoe Basin affecting both the West and North Shore of Lake Tahoe for 3-5 days. The District was forced to run the generators throughout the District to pump down the sewer stations to prevent spill and water stations to keep the storage tanks full of water. Area schools were closed during the outage. Other water districts were running out of water (meaning negative fire suppression in some areas).
- No other past events since 2016 could be recalled.

Vulnerability to and Impacts from Severe Weather: Freeze and Snow

With altitudes ranging from 6,000 to 10,000 feet above msl, extreme cold/freezing temperatures can create significant problems. Of particular concern to the District is the vulnerability of the area to broken utilities and power failures during extreme weather events. Extreme winter weather events are a major concern to the District. Snow and winter weather conditions regularly result in utility outages and the closure of major transportation routes. According to the TCPUD planning team, major winter storms have routinely cut off transportation routes in the district stranding thousands and causing a major impact to services and supplies.

Freeze and Snow and Power Shortage/Power Failure

The US power grid crisscrosses the country, bringing electricity to homes, offices, factories, warehouses, farms, traffic lights and even campgrounds. According to statistics gathered by the Department of Energy, major blackouts are on the upswing. Incredibly, over the past two decades, blackouts impacting at least 50,000 customers have increased 124 percent. The electric power industry does not have a universal agreement for classifying disruptions. Nevertheless, it is important to recognize that different types of outages are possible so that plans may be made to handle them effectively. In addition to blackouts, brownouts can occur. A brownout is an intentional or unintentional drop in voltage in an electrical power supply system. Intentional brownouts are used for load reduction in an emergency. Electric power disruptions can be generally grouped into two categories: intentional and unintentional. More information on types of power disruptions can be found in Section 4.3.2 of the Base Plan.

Assets at Risk

All above ground infrastructure, underground infrastructure in vaults and those with less than 36” of bury (below grade)

Severe Weather: Heavy Rains and Storms (Hail, Lightning)

Likelihood of Future Occurrence–Highly Likely
Vulnerability–Medium

Hazard Profile and Problem Description

Storms in the District occur annually and are generally characterized by heavy rain often accompanied by strong winds and sometimes lightning and hail. Approximately 10 percent of the thunderstorms that occur each year in the United States are classified as severe. A thunderstorm is classified as severe when it contains one or more of the following phenomena: hail that is three-quarters of an inch or greater, winds in excess of 50 knots (57.5 mph), or a tornado. Heavy precipitation in the District falls mainly in the fall and spring in the eastern side of the County, with winter seeing precipitation as snowfall.

Location and Extent

Heavy rain events occur on a regional basis. Rains and storms can occur in any location of the District. All portions of the District are at risk to heavy rains. Most of the severe rains occur during the fall, winter, and spring months. There is no scale by which heavy rains and severe storms are measured. Magnitude of storms is measured often in rainfall and damages. The speed of onset of heavy rains can be short, but accurate weather prediction mechanisms often let the public know of upcoming events. Duration of severe storms in California, Placer County, and the District can range from minutes to hours to days. Information on precipitation extremes can be found in Section 4.3.4 of the Base Plan.

Past Occurrences

There have been past disaster declarations from heavy rains and storms, which were discussed in Past Occurrences of the flood section above. According to historical hazard data, severe weather, including heavy rains and storms, is an annual occurrence in the District. This is the cause of many of the federal disaster declarations related to flooding.

Vulnerability to and Impacts from Heavy Rain and Storms

Heavy rain and severe storms are the most frequent type of severe weather occurrences in the District. These events can cause localized flooding. Elongated events, or events that occur during times where the ground is already saturated can cause 1% and 0.2% annual chance flooding. Wind often accompanies these storms and has caused damage in the past. Hail and lightning are rare in the District.

Actual damage associated with the effects of severe weather include impacts to property, critical facilities (such as utilities), and life safety. Heavy rains and storms often result in localized flooding creating significant issues. Roads can become impassable and ground saturation can result in instability, collapse, or other damage to trees, structures, roadways and other critical infrastructure. Floodwaters and downed trees can break utilities and interrupt services.

During periods of heavy rains and storms, power outages can occur. These power outages can affect pumping stations and lift stations that help alleviate flooding. More information on power shortage and

failure can be found in the Severe Weather: Extreme Heat Section above, as well as in Section 4.3.2 of the Base Plan.

Often during these events, the local stormwater drainage system can be impacted. The primary impact to the area within District boundaries is the localized flooding caused by these heavy rains.

Assets at Risk

All water and sewer assets are vulnerable to flood from heavy rains and storms, including above ground structures and below ground infrastructure.

Severe Weather: High Winds and Tornadoes

Likelihood of Future Occurrence–Highly Likely
Vulnerability–High

Hazard Profile and Problem Description

High winds, as defined by the NWS glossary, are sustained wind speeds of 40 mph or greater lasting for 1 hour or longer, or winds of 58 mph or greater for any duration. High winds can cause significant property and crop damage, threaten public safety, and have adverse economic impacts from business closures and power loss. High winds can also cause PSPS events.

Tornadoes are rotating columns of air marked by a funnel-shaped downward extension of a cumulonimbus cloud whirling at destructive speeds of up to 300 mph, usually accompanying a thunderstorm. Tornadoes form when cool, dry air sits on top of warm, moist air. Tornadoes are the most powerful storms that exist. Tornadoes, though rare, are another severe weather hazard that can affect areas of the Placer County Planning Area, primarily during the rainy season in the late fall, winter, and early spring, primarily in the western part of the County.

Location and Extent

The entire District is subject to significant, non-tornadic (straight-line), winds. Each area of the County is at risk to high winds. Magnitude of winds is measured often in speed and damages. These events are often part of a heavy rain and storm event, but can occur outside of storms. The speed of onset of winds can be short, but accurate weather prediction mechanisms often let the public know of upcoming events. Duration of winds in California is often short, ranging from minutes to hours. The Beaufort scale is an empirical 12 category scale that relates wind speed to observed conditions at sea or on land. Its full name is the Beaufort Wind Force Scale. The Beaufort Scale was shown in Section 4.3.5 of the Base Plan.

Portions of the County are also located in a special wind hazard region, which is a result of foehn winds. A foehn wind is a type of dry down-slope wind that occurs in the lee (downwind side) of a mountain range. Winds of this type are called "snow-eaters" for their ability to make snow melt or sublimate rapidly. This snow-removing ability is caused not only by warmer temperatures, but also the low relative humidity of the air mass coming over the mountain(s). They are also associated with the rapid spread of wildfires, making some regions which experience these winds particularly fire prone.

Tornadoes, while rare, can occur at any location in the County and District, but would more likely occur in Western Placer. Prior to February 1, 2007, tornado intensity was measured by the Fujita (F) scale. This scale was revised and is now the Enhanced Fujita scale. Both scales are sets of wind estimates (not measurements) based on damage. The new scale (EF) provides more damage indicators (28) and associated degrees of damage, allowing for more detailed analysis and better correlation between damage and wind speed. It is also more precise because it considers the materials affected and the construction of structures damaged by a tornado. The F Scale and EF Scale are shown in Section 4.3.5 of the Base Plan.

Past Occurrences

There has been no federal or state disaster declarations in the County for winds and tornadoes. The District noted that since high winds is a regional phenomenon, events that affected the upper elevations of the County also affected the District. Those past occurrences were shown in the Base Plan in Section 4.3.5.

Vulnerability to and Impacts from Severe Weather: Wind and Tornado

High winds are common occurrences in the District throughout the entire year. Straight line winds are primarily a public safety and economic concern. Windstorm can cause damage to structures and power lines which in turn can create hazardous conditions for people. Debris flying from high wind events can shatter windows in structures and vehicles and can harm people that are not adequately sheltered. High winds can impact critical facilities and infrastructure and can lead to power outages. Wind can also drive wildfire flames, spreading wildfires quickly During periods of high winds and dry vegetation, wildfire risk increases. High winds that occur during periods of extreme heat can cause PSPS events to be declared in the County. More information on power shortage and failure can be found in the Severe Weather: Extreme Heat Section above, as well as in Section 4.3.2 of the Base Plan.

Impacts from high winds in the District will vary. Future losses from straight line winds include:

- Downed trees
- Power line impacts and economic losses from power outages
- Increased PSPS events
- Sewer spills due to power outage affecting pumping stations
- Water outages due to power outages affecting pumping stations
- Occasional building damage, primarily to roofs

Assets at Risk

All water and sewer assets are vulnerable to failure due to wind events.

Tree Mortality

Likelihood of Future Occurrence–Highly Likely
Vulnerability–High

Hazard Profile and Problem Description

One of the many vulnerabilities of drought in Placer County is the increased risk of widespread tree mortality events that pose hazards to people, homes, and community infrastructure, create a regional economic burden to mitigate, and contribute to future fuel loads in forests surrounding communities. During extended drought, tree mortality is driven by a build-up in endemic bark beetle populations and exacerbated by latent populations of a suite of native insects and disease. Non-native forest pests (insects and/or pathogens) can also contribute to tree mortality events.

Location and Extent

Onset of tree mortality events can be relatively fast; however conditions – such as high stand densities – that lead to tree mortality accumulate slowly over time. Duration of tree mortality is lengthy, as once the tree dies, it remains in place until removed by human activity, wildfire, or breakdown of the wood by nature. Many areas in Placer County have seen increases in tree mortality. The County has mapped these areas, and that map was shown in Section 4.3.18 of the Base Plan. Using a color legend, the map provided by CAL FIRE shows a scale of:

- Deep burgundy depicting areas with more than 40 dead trees per acre
- Red depicting 15 to 40 dead trees per acre
- Orange depicting 5 to 15 dead trees per acre
- Yellow depicting 5 or less dead trees per acre

In the past decade, mortality has increased in the eastern portion of Placer County. During the 2012-2018 drought, the state of California Tree Mortality Task force designated multiple Tier 1 and Tier 2 High Hazard Zones where tree morality posed an elevated risk to human health, properties, and resource values. A number of Placer County areas were designated during this event and the majority of Placer County watersheds were designated as Tier 2 high hazard zones because of the significant levels of tree mortality, along with numerous Tier 1 High hazard "hot spots". A map of these areas was shown in in Section 4.3.18 of the Base Plan.

Past Occurrences

There have been no state or federal disasters in the County related directly to tree mortality, though it has most likely contributed to the intensity of past wildfires in the County. Those events are shown in the Past Occurrences section of Wildfire below. In 2015, then-Governor Edmund G. Brown Jr. proclaimed a state of emergency due to the extreme hazard of the dead and dying trees. Following the proclamation, 10 counties were determined to be most affected, which included Placer County. Placer County proclaimed a local emergency due to tree mortality conditions on Dec. 8, 2015. No events of past tree mortality have affected the District. Though the District noted it was unclear if the Washoe Fire in 2007 was worsened by tree mortality.

Vulnerability to and Impacts from Tree Mortality

Placer County is unique in that many residential and business areas of the community are in the wildland urban interface/intermix with the forest. Trees in these interface/intermix areas are particularly vulnerable

to insect and/or drought driven mortality because of the additional stressors that urban environments impose on trees (i.e. soil compaction, altered hydrology, physical damage, heat islands etc.). This exacerbates the occurrence of tree mortality within the populated settings of the County.

Dead trees are a hazard to the general public and forest visitors, but the risk of injury, death, property damage or infrastructure damages varies depending how the hazard interacts with potential targets. Dead trees within the wildland urban intermix or wildland urban interface or urban areas therefore pose a greater risk to due to their proximity to residents, businesses, and road, power, and communication infrastructure.

Dead trees may fall or deteriorate in their entirety or in part – either mechanism has the potential for injury, death, or inflicting severe damage to targets. As the time since tree mortality increases, so does the deterioration of wood and the potential for tree failure.

Primary impacts include facility damage due to falling trees and increased fuels for wildfire proliferation.

Assets at Risk

All water and sewer assets are vulnerable to tree mortality due to physical damage or by wildfire.

Wildfire

Likelihood of Future Occurrence–Highly Likely
Vulnerability–High

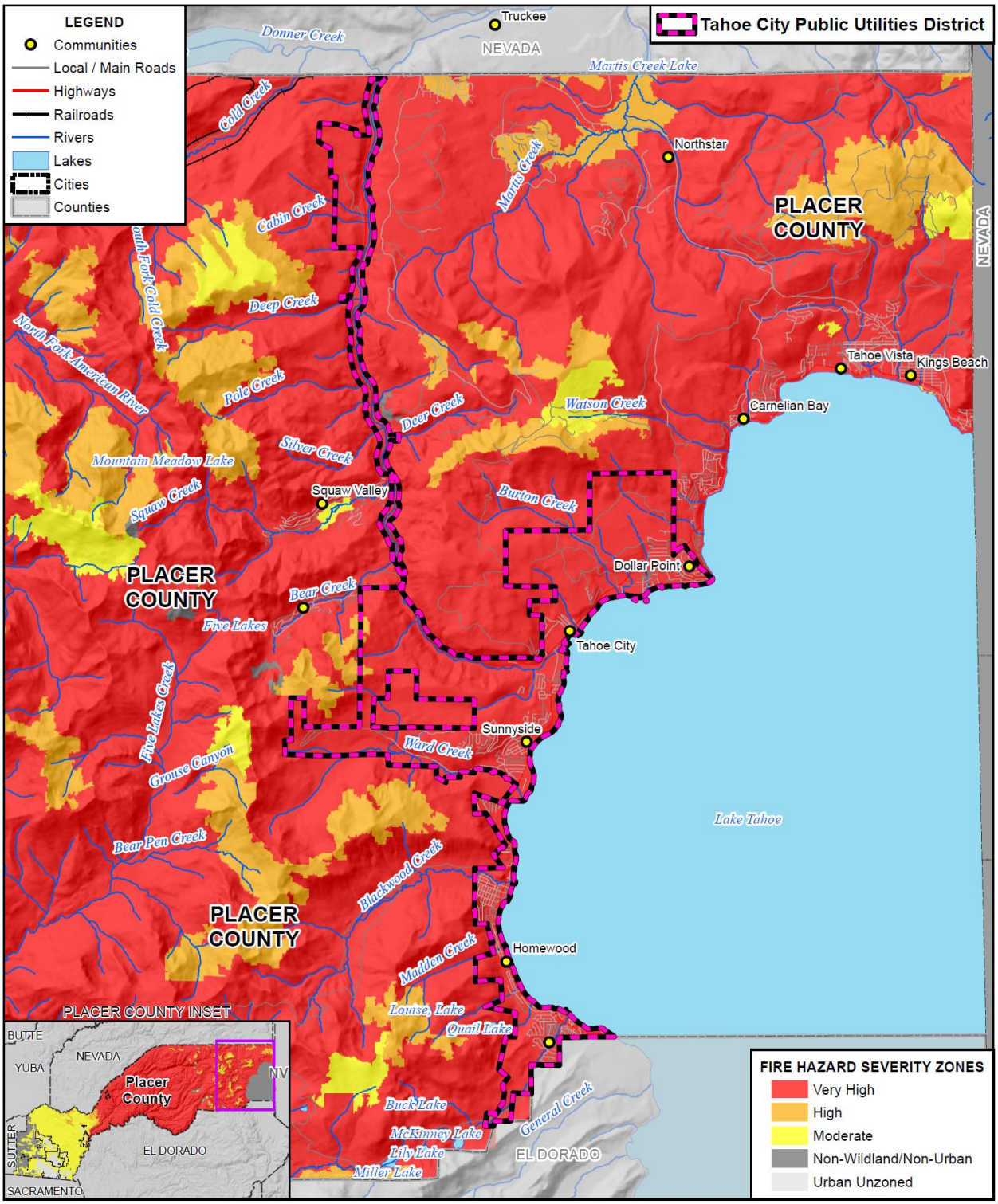
Hazard Profile and Problem Description

Wildland fire and the risk of a conflagration is an ongoing concern for the TCPUD. Throughout California, communities are increasingly concerned about wildfire safety as increased development in the foothills and mountain areas and subsequent fire control practices have affected the natural cycle of the ecosystem. Wildland fires affect grass, forest, and brushlands, as well as any structures located within them. Where there is human access to wildland areas the risk of fire increases due to a greater chance for human carelessness and historical fire management practices. Historically, the fire season extends from early spring through late fall of each year during the hotter, dryer months; however, in recent years, the risk of wildfire has become a year around concern. Fire conditions arise from a combination of high temperatures, low moisture content in the air and fuel, accumulation of vegetation, and high winds. While wildfire risk has predominantly been associated with more remote forested areas and wildland urban interface (WUI) areas, significant wildfires can also occur in more populated, urban areas.

Location and Extent

Wildfire can affect all areas of the District. CAL FIRE has estimated that the risk varies across the District and has created maps showing risk variance. Following the methodology described in Section 4.3.19 of the Base Plan, wildfire maps for the TCPUD were created. Figure W-3 shows the CAL FIRE FHSZ in the District. As shown on the maps, FHSZs within the District range from High to Very High.

Figure W-3 TCPUD – Fire Hazard Severity Zones



Data Source: Cal-Fire (Draft 09/2007 - c31fhszl06_1, Adopted 11/2007 - fhszs06_3_31, Recommended 12/2008 - c31fhszl06_3), Placer County GIS, Cal-Atlas, NVBLM; Map Date: 2021.

Wildfires tend to be measured in structure damages, injuries, and loss of life as well as on acres burned. Fires can have a quick speed of onset, especially during periods of drought or during hot dry summer months. Fires can burn for a short period of time, or may have durations lasting for a week or more.

Past Occurrences

There has been five state and six federal disaster declarations for Placer County from fire. These can be seen in Table W-10.

Table W-10 Placer County – State and Federal Disaster Declarations Summary 1950-2020

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Fire	5	1961, 1965, 1973, 1987, 2010	6	2002, 2004, 2008, 2009, 2014 (twice)

Source: Cal OES, FEMA

The District was affected by the Washoe Fire. This fire occurred in the wildland urban interface area of Tahoe Park and Tahoe Woods Subdivision, along the West shore of Lake Tahoe. The fire was caused by a failure of some propane equipment. Although no lives were lost, the fire destroyed 5 residential structures and encompassed 19 acres. Power and gas utilities were incurred damages. There were also losses to timber assets, loss of watershed protection, and loss of the aesthetic value of a scenic corridor. This event caused major disruptions to west shore and Tahoe City traffic and business on a busy summer weekend. Highway 89, West Lake was closed for a period of time.

Lastly, impacts from smoke and air quality issues have become a regular occurrence due to the marked increase in wildfire activity in Northern and Central California. Poor air quality has resulted in disruption of District maintenance activities due the work force being sent home or sequestered inside due to local air quality warnings by the local AQMD.

Vulnerability to and Impacts from Wildfire

Risk and vulnerability to the Placer County Planning Area and the District from wildfire is of significant concern, with some areas of the Planning Area being at greater risk than others as described further in this section. High fuel loads in the Planning Area, combined with a large built environment and population, create the potential for both natural and human-caused fires that can result in loss of life and property. These factors, combined with natural weather conditions common to the area, including periods of drought, high temperatures, low relative humidity, and periodic winds, can result in frequent and potentially catastrophic fires. During the nearly year around fire season, the dry vegetation and hot and sometimes windy weather results in an increase in the number of ignitions. Any fire, once ignited, has the potential to quickly become a large, out-of-control fire. As development continues throughout the County and the District, especially in these interface areas, the risk and vulnerability to wildfires will likely increase.

Potential impacts from wildfire include loss of life and injuries; damage to structures and other improvements, natural and cultural resources, croplands, and loss of recreational opportunities. Wildfires can cause short-term and long-term disruption to the District. Fires can have devastating effects on

watersheds through loss of vegetation and soil erosion, which may impact the District by changing runoff patterns, increasing sedimentation, reducing natural and reservoir water storage capacity, and degrading water quality. Fires can also affect air quality in the District; smoke and air pollution from wildfires can be a severe health hazard.

Although the physical damages and casualties arising from large fires may be severe, it is important to recognize that they also cause significant economic impacts by resulting in a loss of function of buildings and infrastructure. Economic impacts of loss of transportation and utility services may include traffic delays/detours from road and bridge closures and loss of electric power, potable water, and wastewater services. Schools and businesses can be forced to close for extended periods of time. Recently, the threat of wildfire, combined with the potential for high winds, heat, and low humidity, has caused PG&E to initiate PSPSs which can also significantly impact a community through loss of services, business closures, and other impacts associated with loss of power for an extended period. More information on power shortage and failure can be found in the Severe Weather: Extreme Heat Section above, as well as in Section 4.3.2 of the Base Plan. In addition, catastrophic wildfire can create favorable conditions for other hazards such as flooding, landslides, and erosion during the rainy season.

Further, many of the communities in the District are limited to one route access and egress in the event of a major wildfire. Historically, these routes are closed during major events, stranding many people, including visitors, away from their families and homes. So far there has been no loss of life attributed to the limited evacuation routes, but it is likely only a matter of time before people are cut off and trapped by a major fire event.

Lastly, impacts from smoke and air quality issues have become a regular occurrence due to the marked increase in wildfire activity in Northern and Central California. Poor air quality has resulted in disruption of District maintenance activities due the work force being sent home or sequestered inside due to local air quality warnings by the local AQMD.

Public Safety Power Shutoff (PSPS)

A new intentional disruption type of power shortage/failure event has recently occurred in California. In recent years, several wildfires have started as a result of downed power lines or electrical equipment. This was the case for the Camp Fire in 2018. As a result, California's energy companies (including PG&E and Liberty Utilities), at the direction of the California Public Utilities Commission (CPUC), are coordinating to prepare all Californians for the threat of wildfires and power outages during times of extreme weather. To help protect customers and communities during extreme weather events, electric power may be shut off for public safety in an effort to prevent a wildfire. This is called a PSPS. More information on PSPS criteria can be found in Section 4.3.2 of the Base Plan.

Assets at Risk

All above ground structures and those requiring electricity to operate are at risk to wildfire and PSPS, including all sewer and water pumping facilities, administrative office facilities, and equipment storage facilities.

W.6 Capability Assessment

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This capabilities assessment is divided into five sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, mitigation education, outreach, and partnerships, and other mitigation efforts.

W.6.1. Regulatory Mitigation Capabilities

Table W-11 lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the TCPUD.

Table W-11 TCPUD Regulatory Mitigation Capabilities

Plans	Y/N Year	Does the plan/program address hazards? Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?
Comprehensive/Master Plan/General Plan	N	
Capital Improvements Plan	Y	Plan includes projects that address hazards, and are included in mitigation strategies.
Economic Development Plan	N	
Local Emergency Operations Plan	Y 2013	TCPUD Emergency Response Plan, Jan. 2018. Plan typically addresses response to an emergency and not mitigation.
Continuity of Operations Plan	N	
Transportation Plan	N	
Stormwater Management Plan/Program	N	
Engineering Studies for Streams	N	
Community Wildfire Protection Plan	N	
Other special plans (e.g., brownfields redevelopment, disaster recovery, coastal zone management, climate change adaptation)	Y	Sewer System Management Plan, May 2019 Urban Water Management Plan, July 2016
Building Code, Permitting, and Inspections	**Y/N**	**Are codes adequately enforced?**
Building Code	N	Version/Year:
Building Code Effectiveness Grading Schedule (BCEGS) Score	N	Score:
Fire department ISO rating:	Y	Rating: 4
Site plan review requirements	N	

Land Use Planning and Ordinances	Y/N	Is the ordinance an effective measure for reducing hazard impacts? Is the ordinance adequately administered and enforced?
Zoning ordinance	N	
Subdivision ordinance	N	
Floodplain ordinance	N	
Natural hazard specific ordinance (stormwater, steep slope, wildfire)	N	
Flood insurance rate maps	N	
Elevation Certificates	N	
Acquisition of land for open space and public recreation uses	N	
Erosion or sediment control program	N	
Other		
How can these capabilities be expanded and improved to reduce risk?		
Most projects that serve as mitigation strategies are captured within Capital Improvement Plan.		

Source: TCPUD

Tahoe City Public Utilities District Emergency Response Plan, 2018

The TCPUD Emergency Response Plan serves as a guide for the District's response to emergencies/disasters within District boundaries, and to coordinate and assist with disaster response in neighboring jurisdictions.

Tahoe City Public Utilities District Sewer System Management Plan, 2014

The TCPUD Sewer System Management Plan serves as a guide for Districts response to emergencies/disasters within District boundaries as it relates to its sewer collection system.

Codes and Ordinances

Avalanche

Placer County's avalanche management program defines Potential Avalanche Hazard Areas (PAHAs) where the minimum probability of avalanche occurrence is 1 in 100 per year or where avalanche damage has already occurred. According to the Placer County Avalanche Ordinance the following information must be disclosed in PAHAs:

- Identification that a structure is within a PAHA
- A warning that avalanche control work is conducted in the area and avalanche warnings will be provided as feasible
- Identification of sources that provide weather information and general information on avalanches

In addition, the county limits construction as necessary in PAHAs and will not issue a building permit for construction in a PAHA without certifying that the structure will be safe under the anticipated snow loads and conditions of an avalanche.

Tahoe City Public Utilities District Ordinances and Permits

TCPUD has enacted several ordinances:

- Water Ordinance 263
- Sewer Ordinance 255

In addition, the District has water and sewer permit requirements specific to:

- New Construction
- Tear Down-Rebuilds and Remodels

W.6.2. Administrative/Technical Mitigation Capabilities

Table W-12 identifies the District department(s) responsible for activities related to mitigation and loss prevention in TCPUD.

Table W-12 TCPUD's Administrative and Technical Mitigation Capabilities

Administration	Y/N	Describe capability Is coordination effective?
Planning Commission	N	
Mitigation Planning Committee	N	
Maintenance programs to reduce risk (e.g., tree trimming, clearing drainage systems)	Y	TCPUD maintains and implements a preventative maintenance program on all of its facilities. TCPUD maintains a staff, fleet and equipment capable of implementing this maintenance program.
Mutual aid agreements	Y	TCPUD actively participates in a local mutual aid agreement with other agencies
Other		
Staff	**Y/N FT/PT**	**Is staffing adequate to enforce regulations? Is staff trained on hazards and mitigation? Is coordination between agencies and staff effective?**
Chief Building Official	N	
Floodplain Administrator	N	
Emergency Manager	Y FT	Utilities/Risk Coordinator is trained on hazards and mitigation.
Community Planner	N	
Civil Engineer	Y FT	Engineering/Senior Civil Engineer is trained on hazards and mitigation.
GIS Coordinator	Y FT	Information Systems and Technology Administrator is trained on hazards and mitigation.
Other		
Technical		
Warning systems/services (Reverse 911, outdoor warning signals)	Y	Fire and Security alarm. Telemetry for the sewer and water stations. Cell phone and radio communications.

Hazard data and information	N	
Grant writing	Y	Grants and Community Information Administrator
Hazus analysis	N	
Other		
How can these capabilities be expanded and improved to reduce risk?		
Continued development of communication and network infrastructure in the area.		

Source: TCPUD

W.6.3. Fiscal Mitigation Capabilities

Table W-13 identifies financial tools or resources that the District could potentially use to help fund mitigation activities.

Table W-13 TCPUD's Fiscal Mitigation Capabilities

Funding Resource	Access/ Eligibility (Y/N)	Has the funding resource been used in past and for what type of activities? Could the resource be used to fund future mitigation actions?
Capital improvements project funding	Y	Replacing or upgrading infrastructure
Authority to levy taxes for specific purposes	Y	Replacing or upgrading infrastructure
Fees for water, sewer, gas, or electric services	Y	Ongoing operation and maintenance
Impact fees for new development	Y	Replacing or upgrading infrastructure
Storm water utility fee	N	
Incur debt through general obligation bonds and/or special tax bonds	Y	Replacing or upgrading infrastructure
Incur debt through private activities	N	
Community Development Block Grant	N	
Other federal funding programs	Y	Both the Lake Tahoe Restoration Act and USFS Omnibus Funding have been used for Fuels Thinning and Water System Improvements to enhance fire protection capabilities. Future funding may be available pending approval of a new Lake Tahoe Restoration Act.
State funding programs	Y	Funding sources from Propositions 50 and 84 and the State Revolving Fund have been used for water and sewer system improvements improving fire protection capacity of the water system and sewer storage and pumping capacity of the sewer system. Future funding may be available in future Propositions as well as State Revolving Funds (SRF) pending approval of submitted projects.
Other		
How can these capabilities be expanded and improved to reduce risk?		

Funding Resource	Access/ Eligibility (Y/N)	Has the funding resource been used in past and for what type of activities? Could the resource be used to fund future mitigation actions?
Any additional funding for infrastructure, specifically water for fire suppression, from federal, state or local sources would be beneficial.		

Source: TCPUD

W.6.4. Mitigation Education, Outreach, and Partnerships

Table W-14 identifies education and outreach programs and methods already in place that could be/or are used to implement mitigation activities and communicate hazard-related information.

Table W-14 TCPUD's Mitigation Education, Outreach, and Partnerships

Program/Organization	Yes/No	Describe program/organization and how relates to disaster resilience and mitigation. Could the program/organization help implement future mitigation activities?
Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	Yes	Truckee River Basin Working Group, Red Cross, Truckee River Watershed Council
Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	Yes	TCPUD water conservation programs. See http://conservation.tcpud.org/
Natural disaster or safety related school programs	No	
StormReady certification	No	
Firewise Communities certification	No	
Public-private partnership initiatives addressing disaster-related issues	Yes	Work with Red Cross on storage of their emergency response equipment for local use.
Other	N/A	
How can these capabilities be expanded and improved to reduce risk?		
Continued partnerships with pertinent stakeholders to bring ideas and projects forward, and support each other's organization by providing collaborative expertise when needed.		

Source: TCPUD

W.6.5. Other Mitigation Efforts

The District has many other completed or ongoing mitigation efforts that include the following:

- Staff educated in the Safety Program
- Website and Quarterly Newsletters to the general public
- Upgrading generators at all pump stations
- Retro fit stations (fire proofing, flood proofing, etc.)
- Fuel Reduction around facilities
- Staff training

Water System, Fire Protection Improvements

Also in the aftermath of the Angora fire in 2007, TCPUD has completed a full analysis of its water systems and is prioritizing the capital improvements necessary to increase fire protection capabilities. Since a significant amount of the District's sub-regional water systems are more than 40 years old and were acquired at various times from developers or other companies, extensive infrastructure work is necessary to meet current standards. TCPUD has successfully worked with the local fire departments, state and federal legislators, and officials to help secure the millions of funding needed to implement recommended improvements. Since 2008, the District has received over $6,000,000 in finding from various sources for water system improvements.

2007 Phase 1 – Highlands Fuel Reduction

Fuel reduction, mastication and track chipping on 25 acres of District owned open space. This property is bounded by North Tahoe High School and single family homes. The fire potential was considered high. This work was completed in 2010.

2008 Blackwood Pump Station Storm Damage

1996 Blackwood Creek overflow flood damage to the Blackwood sewer pump station. F.E.M.A. repair assistance received in the amount of $46,645.00. The T.C.P.U.D. funded a complete retrofit of the pump station at an additional cost of $108,000.00. This retrofit protects the pump station from future flooding and the potential for a large sewage spill into Lake Tahoe. The project was completed in 2008.

2009 Fuel Reduction Program – Chambers Foothills and Quail Lake

Chambers Foothills and Quail Lake Fuel Reduction program, mechanical & hand treatment on 70 acres. Project funded by Nevada and California Fire Safe Council and T.C.P.U.D. participation funding. Grant funding not to exceed $175,000. District participation will be $56,000. The property is bounded by single family homes and commercial business property.

Seismic Stability Study and Retrofit

The District owns eleven (11) water storage tanks. The seismic stability of these tanks was last analyzed in a report prepared by Nolte Associates dated January 2006 and September 2010. Of the 11 analyzed tanks:

- One (1) was built in 2005 and is seismically stable and requires no retrofits (Upper Highlands).
- One (1) is seismically unstable and requires a major foundation and shell retrofit or requires a change in its operational water level (Lower Highlands).
- One (1) is seismically unstable and due to its age and material requires a complete replacement (Bunker), replaced in 2019
- Eight (8) are seismically stable with minor improvements recommended.

Tahoe Cedars Water System Interconnection and Distribution Project

In January 2018, TCPUD acquired and began operating the Tahoe Cedars Water System (formerly Mid Sierra Utilities). Since the acquisition, TCPUD Board of Directors has dedicated significant time towards understanding how to invest in and improve the water supply and fire suppression capabilities of the Tahoe Cedars System.

TCPUD identified a high priority need for backup water supply and additional water storage for the Tahoe Cedars System. The system has been in operation for over 50 years and relied that whole time on one groundwater source with no appreciable backup supply. To correct this, the District developed a project to interconnect the Tahoe Cedars System to the TCPUD's McKinney-Quail Water System. The Project provides the needed backup water supply and emergency water storage, in addition to replacement of critical water system components to enhance fire protection and improve water delivery and pressure. The Project was completed in 2018 at a cost of $1.92 million.

Madden Creek Water System Interconnection and Distribution Project

In January 2018, TCPUD acquired and began operating the Madden Creek Water System (formerly Mid Sierra Utilities). Since the acquisition, TCPUD Board of Directors has dedicated significant time towards understanding how to invest in and improve the water supply and fire suppression capabilities of the Madden System.

TCPUD identified a high priority need for backup water supply and additional water storage for the Madden System. To accomplish this, the District developed this project to interconnect the Madden System to the TCPUD's McKinney-Quail Water System. The Project will provide the needed backup water supply and emergency water storage, in addition to replacement of critical water system components to enhance fire protection and improve water delivery and pressure.

Due to the size and complexity of the Project, it has been broken into a two-phased construction schedule; the first phase includes the McKinney-Quail interconnection and associated high pressure transmission line replacement, and the second phase includes water distribution, servicing, and fire protection improvements. Phase 1 construction was completed in 2019 at a cost of $970,000. Phase 2 is scheduled to be completed in Summer of 2021 at a cost of $2.3 million.

The project benefits the public by enhancing water supply and reliability as well as improving fire protection within the water system service area.

Tahoe Cedars and Madden Creek Systems Master Plans

In January 2018, TCPUD acquired and began operating the Tahoe Cedars and Madden Creek Water Systems (formerly Mid Sierra Utilities). Since the acquisition, TCPUD Board of Directors has dedicated significant time towards understanding how to invest in and improve the water supply and fire suppression capabilities of these systems and has already provided critical interconnectivity for these systems as discussed above.

However, the majority water distribution systems within these two water service areas are failing and lacks critical basic fire protection needs such as fire hydrants and adequate flow, pressure and storage to support basic fire suppression activities. The District hired Carollo Engineers in 2020 to prepare a comprehensive waters system master plans for both systems. The final plans are due to be completed in 2021 and provide the framework for essentially full system replacements for both service areas. The estimated cost to complete the master plans is approximately $215,000. Initial system replacement estimates for both systems combines is approximately $50 million dollars.

Timberland Interconnection and Distribution Improvements

In January 2018, TCPUD acquired the former Timberland Water Company and began providing water service to Timberland's former customers on January 2, 2018. Following the acquisition, the TCPUD Board of Directors has dedicated significant time in understanding how to invest in and improve the water supply and fire suppression capabilities of the system.

Phase I of the Project was completed in 2019. This phase included installation of approximately 4,440 linear feet of 8-inch water main, 487 linear feet of 4-inch water main, 80 service reconnections and meters, 10 new fire hydrants, and 6 refurbished fire hydrants to replace the varying 2-inch to 6-inch existing system infrastructure.

Phase II completed the Project in 2020 by constructing the remaining new waterlines, service laterals, valves and fire hydrants on roads north of Sugar Pine Road on Cedar Lane, Rustic Lane, and Shady Lane, as well as Timberland Lane and Hwy 89.

The project benefits public health through enhancement of water supply and reliability as well as improving fire protection within the water system service area. Total cost for Phase 1 and II was $3.6 million.

West Lake Tahoe Regional Water Treatment Plant

The Tahoe City Public Utility District (TCPUD) is undertaking the construction of a permanent, year round drinking water treatment plant to replace the temporary seasonal treatment plant located at Chambers Landing. The new water treatment plant will provide a reliable, drought-resistant, and safe drinking water source to the TCPUD's McKinney-Quail Water Service area and, potentially, other water systems in the West Lake Tahoe region.

In October of 2015, the TCPUD Board of Directors completed the California Environmental Quality Act (CEQA) review process for the project, adopting a Mitigated Negative Declaration and Mitigation

Monitoring & Reporting Program and approving the project. The Project is out to public bid as of February 26, 2021 and scheduled to be awarded and begin construction in mid-2021.

Backup Generator Installations

The TCPUD currently operates a total of 32 permanent generator sites within our service territory to power critical water and sewer pumping facilities. In addition, the TCPUD owns and operates a fleet of 5 portable generators that can be towed anywhere in the District. Since 2016, the TCPUD has installed or acquired 9 new fixed generator sites.

These generators supply emergency power supply to critical facilities during power outages caused by a multitude of hazards including weather related power outage events, PSPS outage events, and possible power disruption due to wildfire.

W.7 Mitigation Strategy

W.7.1. Mitigation Goals and Objectives

The TCPUD adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy.

W.7.2. Mitigation Actions

The planning team for the TCPUD identified and prioritized the following mitigation actions based on the risk assessment. Background information and information on how each action will be implemented and administered, such as ideas for implementation, responsible office, potential funding, estimated cost, and timeline are also included. The following hazards were considered a priority for purposes of mitigation action planning:

- Avalanche
- Dam Failure
- Drought & Water Shortage
- Earthquake
- Floods: 1%/0.2% annual chance
- Floods: Localized Stormwater
- Landslides, Mudslides, and Debris Flows
- Seiche
- Severe Weather: Freeze and Snow
- Severe Weather: Heavy Rains and Storms
- Severe Weather: High Winds and Tornadoes
- Tree Mortality
- Wildfire

It should be noted that many of the projects submitted by each jurisdiction in Table 5-4 in the Base Plan benefit all jurisdictions whether or not they are the lead agency. Further, many of these mitigation efforts are collaborative efforts among multiple local, state, and federal agencies. In addition, the countywide public outreach action, as well as many of the emergency services actions, apply to all hazards regardless

of hazard priority. Collectively, this multi-jurisdictional mitigation strategy includes only those actions and projects which reflect the actual priorities and capacity of each jurisdiction to implement over the next 5-years covered by this plan. It should further be noted, that although a jurisdiction may not have specific projects identified for each priority hazard for the five year coverage of this planning process, each jurisdiction has focused on identifying those projects which are realistic and reasonable for them to implement and would like to preserve their hazard priorities should future projects be identified where the implementing jurisdiction has the future capacity to implement.

Multi-Hazard Actions

Action 1. West Shore Storage Augmentation Project

Hazards Addressed: Wildfire, Drought and Water Shortage

Goals Addressed: 1, 2, 3, 4, 5, 6, 7

Issue/Background: The west shore of Lake Tahoe is comprised of 10 separate public water systems each with its own infrastructure such as water sources, storage tanks, water mains and services. The systems all vary in their ability to provide sufficient fire flow rates and volume due to differing hydraulic grade lines (elevation of the tanks) and varying capacities of storage tanks. Most systems fall short of meeting basic fire code requirements for fire flow rates and volumes to provide adequate duration of flow.

Project Description: This project proposes to construct two new storage tanks to interconnect with two existing storage tanks to create a network of storage facilities at the same elevations which will interconnect 6 of those 10 systems. In addition, once interconnected, all systems will have access to approximately 1 million gallons per day of treated surface water from Lake Tahoe from the West Lake Tahoe Regional Water Treatment Plant which begins construction in 2021.

Other Alternatives:

- Build six new tanks and build surface water treatment plants for each system.
- No Project - Continue to operate fractured water systems with significant fire flow storage and flow deficiencies

Existing Planning Mechanism(s) through which Action Will Be Implemented: Master plan will be completed for this project in 2021

Responsible Agency/ Department/Partners: Tahoe City Public Utility District

Cost Estimate: $5.0 million

Benefits (Losses Avoided): Ability to prevent structure fires from entering the WUI, structure protection from wildfires entering the WUI, drought resistant source capacity.

Potential Funding: Placer County Water Agency, SRF, Rate Revenue, Ad Valorem Property Tax

Timeline: 2021-2024

Project Priority (H, M, L): High

Action 2. Tahoe Cedars Water System Interconnection and Distribution Project

Hazards Addressed: Wildfire, Drought and Water Shortage

Goals Addressed: 1, 2, 3, 4, 5, 6, 7

Issue/Background: The Tahoe Cedars Water system was originally built in the 1950's and to support the Tahoma subdivision. The system is largely comprised of smaller 4 inch diameter water mains and is approximately 75% deficient in the necessary number of fire hydrants required to meet modern fire codes.

Project Description: This project proposes to rebuild approximately 80,000 lineal feet of water main, install approximately 100 fire hydrants and approximately 1,180 water services and meters. Approximately 15,000 feet of pipeline is located in Placer County.

Other Alternatives: No Project - Continue to operate a system that cannot support modern fire suppression measures.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Master plan completed for this project in 2021

Responsible Agency/ Department/Partners: Tahoe City Public Utility District

Cost Estimate: $45 million (Approximately $5 million in Placer County)

Benefits (Losses Avoided): Ability to prevent structure fires from entering the WUI, structure protection from wildfires entering the WUI, reduce water use by replacing leaking infrastructure and by installation of water meters.

Potential Funding: Placer County Water Agency, SRF, Rate Revenue, Ad Valorem Property Tax

Timeline: 2021-2030

Project Priority (H, M, L): High

Action 3. Madden Creek Water System Interconnection and Distribution Project

Hazards Addressed: Wildfire, Drought and Water Shortage

Goals Addressed: 1, 2, 3, 4, 5, 6, 7

Issue/Background: The Madden Creek Water system was originally built in the 1930s and 1940s to support the small summer home community of Homewood. As time went on the water system began to serve both year round residences and commercial businesses. The system is largely comprised of smaller 2 inch diameter water mains and is approximately 75% deficient in the necessary number of fire hydrants required to meet modern fire codes.

Project Description: This project proposes to rebuild approximately 24,000 lineal feet of water main, 40 fire hydrants and approximately 150 water services and meters.

Other Alternatives: No Project - Continue to a system that cannot support modern fire suppression measures.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Master plan completed for this project in 2021

Responsible Agency/ Department/Partners: Tahoe City Public Utility District

Cost Estimate: $3.8 million

Benefits (Losses Avoided): Ability to prevent structure fires from entering the WUI, structure protection from wildfires entering the WUI, reduce water use by replacing leaking infrastructure and by installation of water meters.

Potential Funding: Placer County Water Agency, SRF, Rate Revenue, Ad Valorem Property Tax

Timeline: 2021-2025

Project Priority (H, M, L): High

Action 4. West Lake Tahoe Regional Water Treatment Plant

Hazards Addressed: Wildfire, Drought and Water Shortage

Goals Addressed: 1, 2, 3, 4, 5, 6, 7

Issue/Background: The west shore of Lake Tahoe is comprised of 10 separate public water systems each with its own infrastructure such as water sources, storage tanks, water mains and services. The primary source of water in these systems is groundwater. Groundwater is this area of the Tahoe basin is subject to widely variable water quality as well as limited availability during prolonged drought periods. The use of Lake Tahoe as a dedicated source of drinking water will provide a drought tolerant source of water with predictable quality and the necessary firm capacity to provide water supply during wildfire events.

Project Description: This project proposes to construct a new water treatment plant capable of providing up to 1 million gallons a day of drinking water to the Placer County communities of Tahoma north to the Timberland Subdivision. The plant will be designed to be expandable to 1.5 million gallons per day in the future.

Other Alternatives:

- Replace individual wells with individual surface water plants.
- No Project - Continue to operate fractured water systems with individual wells subject to water quality and supply issues

Existing Planning Mechanism(s) through which Action Will Be Implemented: Preliminary Design Report completed in 2014.

Responsible Agency/ Department/Partners: Tahoe City Public Utility District

Cost Estimate: $15 million

Benefits (Losses Avoided): Drought resistant source capacity, ability to prevent structure fires from entering the WUI, structure protection from wildfires entering the WUI, drought resistant source capacity.

Potential Funding: Placer County Water Agency, SRF, Rate Revenue, Ad Valorem Property Tax

Timeline: 2021-2024

Project Priority (H, M, L): High